Innovations & changements de pratiques
Lutte contre les micropolluants des eaux urbaines

RILACT SIPIBEL
Site Pilote de Bellecombe

Risques et leviers d'action relatifs aux rejets de médicaments, détergents et biocides dans les effluents hospitaliers et urbains

REVUE DE LA LITTERATURE SCIENTIFIQUE sur les résidus de médicaments dans l'eau

Volet IV Développer des recherches et une étude sociologique
Tâche T4.1 Changement des pratiques
Complément au livrable L1

Auteurs : Centre de documentation de l'EHESP.
Responsables du livrable : Jean-Yves TOUSSAINT (UMR 5600 EVS) et Cyrille HARPET (EHESP).

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<u>Principaux mots-clés</u> : Pollution eau, Médicament, Déchet médical, Eau usée,

Mesure risque, Déchet hospitalier, Santé environnementale, Environnement,

Hôpital, France.

- BRELOT (Elodie), LECOMTE (Vivien), TAILLEFER (Catherine). Médicaments et environnement : Conférence eau & santé, 26-27 mars 2015, Genève-Annemasse. TECHNIQUES HOSPITALIERES 2015/11/01;(754):25-40, fig.

Le Groupe de recherche Rhône-Alpes sur les infrastructures et l'eau (Graie) et l'Association scientifique et technique pour l'eau et l'environnement (Astee) ont organisé en mars 2015 deux jours de conférence sur la question des médicaments dans l'eau, notamment dans les effluents hospitaliers. Ce dossier propose une synthèse des différentes interventions de la conférence ainsi que deux contributions spécifiques. La première présente les programmes d'expérimentation et de recherche Sipibel et Irmise, développés sur le territoire franco-suisse du bassin genevois, afin de répondre à une triple problématique : la séparation des effluents urbains et des effluents hospitaliers permet-elle d'optimiser le traitement des micropolluants ? Y a-t-il un risque de pollution et, qui plus est, un risque sanitaire du fait des rejets urbains et hospitalier de micropolluants dans l'eau ? Quels sont les leviers d'action et les freins au changement pour réduire l'apport de médicaments dans l'environnement ? La deuxième a été centrée sur les enjeux économiques, sanitaires, environnementaux des usages et du cycle de vie du médicament en France ainsi que sur le rôle du pharmacien hospitalier pour promouvoir les bons usages et faire les liens nécessaires entre santé publique et environnement.

Mots-clés : Pollution eau, Médicament, Détersif, Déchet, Déchet hospitalier, Station épuration, Traitement eau, Eau usée, Hôpital, Analyse eau, Polluant, Indicateur, Pharmacien hospitalier, Rôle du professionnel, Santé environnementale, Haute Savoie, France

- LAVAUD (A.), DUPUIS (A.), NAULEAU (F.), et al.. Développement d'une méthodologie pour l'estimation des concentrations en résidus médicamenteux dans les eaux de rejets hospitaliers. TSM TECHNIQUES SCIENCES METHODES 2015/10/01;(10):45-56, tabl.

Les résidus médicamenteux et leur présence dans les eaux usées font partie des récentes interrogations des autorités sanitaires et environnementales. Les réglementations européennes et françaises relatives à la qualité des eaux ne définissent pas de niveaux de concentration limites pour ces substances. Pourtant, leur présence a déjà été rapportée dans les eaux de surface, souterraines, potables et dans les eaux usées. Un aspect important à prendre en compte dans cette problématique est que les résidus médicamenteux sont pseudo-persistants : l'apport relativement important et continu de ces micropolluants par les stations d'épuration au milieu naturel est plus important que les phénomènes de dégradations ou de transformation qu'ils subissent dans l'environnement. (introd.).

Mots-clés : Médicament, Hôpital, Eau usée, Pollution eau, Déchet médical, Estimation, Méthodologie, Protection environnement, Développement durable, France

- STEICHEN (Pascale), ANTRI-BOUZAR (Chahnez). La gestion juridique des résidus médicamenteux en France : Questionnements juridiques autour de la pollution émergente hospitalière. REVUE DE DROIT SANITAIRE ET SOCIAL 2015/09/01;(5):879-890.

Le médicament constitue, a priori, un moyen thérapeutique pour atteindre un certain état de bien-être. Cette conception est cependant en train d'évoluer. Aujourd'hui, la science démontre que cette substance devient un polluant du fait qu'elle entraîne des impacts sur la santé humaine et sur l'environnement. Un état des lieux de la réglementation française révèle d'importantes lacunes relevées principalement au niveau de la gestion des rejets des activités génératrices de cette substance. Se posent à cet effet, la question des responsabilités pour les dommages causés par cette pollution et la question du statut juridique des effluents hospitaliers que les stations d'épuration n'arrivent pas à traiter.

Mots-clés : Médicament, Pollution eau, Qualité eau, Station épuration, Hôpital, Déchet hospitalier, Eau usée, Epuration eau, Réglementation, Responsabilité, Polluant, Protection environnement

- BOIVIN (Pierre), DUPUIS (Antoine), LAVAUD (Alexandre), NAULEAU (Fabrice), et al.. Résidus médicamenteux des hôpitaux. Une méthode simple d'estimation. TECHNIQUES HOSPITALIERES 2014/01/01;(743):25-29, fig.

Les résidus médicamenteux sont reconnus en tant que source de pollution des eaux, considérée comme une préoccupation environnementale et de santé dans plusieurs pays. Le centre hospitalier universitaire de Poitiers, en partenariat avec l'équipe de chimie et traitement des eaux (CETE) de l'institut de chimie des milieux et matériaux de Poitiers (IC2MP) et la société Saur, a initié une étude portant sur la présence de résidus médicamenteux dans ses eaux usées, menée d'avril à décembre 2012. Elle visait à caractériser les substances médicamenteuses d'intérêt, à identifier les bâtiments cibles du CHU sur lesquels faire porter l'étude, et à développer et valider une méthodologie pour l'estimation des concentrations.

Mots-clés : Pollution eau, Médicament, Eau usée, Hôpital, Dosage, Estimation, Evaluation, Polluant, Analyse eau, Méthodologie, CHU, Déchet hospitalier, Vienne, France

- BRELOT (E.), LECOMTE (V.), PATOIS (L.). Le site pilote de Bellecombe (Sipibel) sur les effluents hospitaliers et stations d'épuration urbaines : premiers résultats du suivi. TECHNIQUES SCIENCES METHODES : GENIE URBAIN GENIE RURAL 2013/12/01;(12):85-101, fig.

Le site pilote de Bellecombe (Sipibel) a été mis en place à partir de 2010 avec pour objectifs d'étudier la caractérisation, la traitabilité et les impacts des effluents hospitaliers en station d'épuration urbaine. Il est composé

de trois sous-systèmes : - le centre hospitalier Alpes-Léman (CHAL) mis en service en février 2012 - une station d'épuration dont une ligne de traitement est entièrement dédiée au traitement des effluents hospitaliers - un milieu récepteur, la rivière Arve. Cet article revient sur les caractéristiques du site et du projet ainsi que sur les premiers résultats de l'observatoire du site qui a pour vocation d'assurer un suivi des effluents sur un minimum de trois ans.

Mots-clés : Déchet hospitalier, Médicament, Pollution eau, Analyse eau, Eau usée, Station épuration, Traitement eau, Rivière, Protection environnement, Boue station épuration, Hôpital, Haute Savoie, France.

- TOMA (Olivier). L'eau ressource naturelle épuisable. DH MAGAZINE - LE DECIDEUR HOSPITALIER 2013/07-09;(147):30-39, phot.

Gros consommateur d'eau douce, les établissements de santé sont aussi de gros pollueurs : rejets de molécules médicamenteuses, de produits désinfectants et antiseptiques. Réalisé par le Comité pour le développement durable en santé, ce dossier fait tout d'abord un tour de France des bonnes pratiques hospitalières en matière d'économie d'eau et de gestion des rejets. Puis, il établit un état des lieux des connaissances en matière de pollution des eaux par les médicaments et milite pour l'utilisation au niveau européen de l'indice PBT, une initiative suédoise de classification des médicaments selon leur potentiel de nuisance environnementale.

Mots-clés : Hôpital, Développement durable, Eau, Consommation, Diminution, Gestion eau, Pollution eau, Qualité eau, Médicament, Déchet hospitalier, Protection environnement, France

- MARTIGNAC (Marion), POLLET (Samuel), CLAPAROLS (Catherine), OLIVEROS (Esther), MAURETTE (Marie-Thérèse), DEBUIRE (Jacques), BENOIT-MARQUIE (Florence). Système d'élimination de composés pharmaceutiques présents dans des effluents hospitaliers. TECHNIQUES HOSPITALIERES 2012/07-08;(734):27-31, graph.

Aucune réglementation concernant le rejet des médicaments en sortie d'hôpitaux n'existe à ce jour, hormis pour les produits radiopharmaceutiques, et nous possédons très peu d'informations sur la toxicité chronique ou la bio-accumulation potentielle des composés pharmaceutiques dans le biotope. Partie de ce constat, l'entreprise LOIRA, spécialisée dans le traitement de l'eau, a mis au point un procédé innovant d'élimination des xénobiotiques, Loïlyse, présenté ici. Un brevet international a été déposé en 2009 après une série d'essais concluants. L'objectif du pilote consistait à tester la capacité du procédé à traiter des effluents de centres hospitaliers. Le principe installation et la technique du procédé sont présentés.

Mots-clés : Pollution eau, Pollution chimique, Traitement eau, Eau, consommation humaine, Eau surface, Eau souterraine, Eau usée, Médicament, Produit pharmaceutique, Impact, Toxicité, Hôpital, Etablissement sanitaire, Molécule, Expérimentation, Déchet hospitalier

- CHAGAS (T.P.), SEKI (L.M.), DA SILVA (D.M.), ASENSI (M.D.). Occurrence of KPC-2-producing Klebsiella pneumoniae strains in hospital wastewater. THE JOURNAL OF HOSPITAL INFECTION 2011/03;77(3):281-.

Mots-clés : Infection nosocomiale, Hygiène hospitalière, Pharmacorésistance, Médicament antibiotique, Eau, Biologie, Examen bactériologique, Déchet médical

- Agence nationale de sécurité sanitaire de l'alimentation de l'environnement et du travail. (A.N.S.E.S.). Maisons-Alfort. FRA, Ministère du Travail de l'Emploi et de la Santé. Paris. FRA. Campagne nationale

d'occurrence des résidus de médicaments dans les eaux destinées à la consommation humaine. Ressources en eaux brutes et eaux traitées.Maisons-Alfort : ANSES; 2011/01. http://www.bdsp.ehesp.fr/Fulltext/431661/

Alors que la présence de résidus de médicaments dans l'eau interroge la communauté scientifique et la population générale, la Direction Générale de la Santé (DGS) a demandé à l'Agence nationale de sécurité sanitaire (Anses) de réaliser une enquête nationale. Cette enquête, à l'appui d'une campagne nationale de prélèvements, a pour objet de mesurer la présence des résidus de médicaments dans les eaux de consommation. Il s'agit là d'une démarche novatrice, sachant qu'actuellement, les réglementations européennes et françaises relatives à la qualité de l'eau n'incluent pas le contrôle des résidus de médicaments. Pour cette enquête, 45 molécules ont été dosées, dans des eaux brutes et traitées. Dans la majorité des échantillons, aucune molécule n'était quantifiable. Pour les 25% d'échantillons positifs, les analyses ont trouvé, la plupart du temps, la présence simultanée d'une à quatre molécules. Hormis la caféine, les substances les plus fréquemment retrouvées sont la carbamazépine (anti-épileptique) et l'oxazépam (anxiolitique). La concentration cumulée de ces molécules était inférieure à 25ng/L dans 90% des cas pour les eaux traitées. En parallèle à cette campagne, l'Anes et l'Afssaps ont été saisies pour réaliser l'évaluation des risques sanitaires liés à la présence de résidus de médicaments dans les eaux de consommation.

Mots-clés : Eau consommation humaine, Pollution eau, Médicament, Déchet, Déchet médical, Médicament vétérinaire, Analyse eau, Qualité eau, Génie sanitaire, Mesure risque, Composition eau

- HAGUENOER (Jean-Marie). Les résidus de médicaments présentent-ils un risque pour la santé publique ? SANTE PUBLIQUE 2010/05-06;22(3):325-342. http://www.bdsp.ehesp.fr/Fulltext/421011/

Partant du constat de la contamination environnementale par les résidus et déchets médicamenteux, cet article présente tout d'abord les différentes sources de contamination et les milieux concernés. Sources diffuses ou sources ponctuelles, elles peuvent entraîner une pollution des sols, des eaux (résiduaires, stations d'épuration, eaux de surfaces, eaux marines...) des sédiments et des aliments. Cependant l'évaluation des risques pour l'environnement et l'homme est complexe et les données disponibles restent incomplètes en comparaison avec les connaissances toxicologiques. L'article aborde les risques relatifs aux anticancéreux, les résidus antibiotiques et les hormones. Pour terminer, l'article fait le point sur la gestion des risques et les réglementations existantes. Il conclue sur les recommandations de l'Académie nationale de Pharmacie.

Mots-clés : Médicament, Médicament vétérinaire, Pollution atmosphérique, Pollution eau, Pollution sol, Déchet, Déchet agricole, Déchet hospitalier, Déchet industriel, Déchet médical, Hôpital, Elevage, Industrie pharmaceutique, Mesure risque, Environnement, Etat santé, Toxicité, Gestion risque, Réglementation, Recommandation, Prévention, Santé environnementale, France, Monde, Polluant

- GABET (Virginie), MIEGE (Cécile), CHOUBERT (Jean-Marc), MARTIN RUEL (Samuel), COQUERY (Marina). Devenir d'oestrogènes et de bétabloquants dans les filières eau de dix stations d'épuration biologiques des eaux résiduaires urbaines françaises. TECHNIQUES HOSPITALIERES 2009/09-10;(717):61-66, tabl., fig.

Cette étude complète le dossier "effluents liquides" parus en deux parties dans les numéros 714 et 715 de Techniques hospitalières. Elle s'attache à analyser cinq hormones oestrogéniques et dix bêtabloquants dans les eaux de dix stations d'épuration de type épuration biologique.

Mots-clés : Déchet, Déchet liquide, Déchet hospitalier, Hormone, Médicament, Polluant, Toxicité, Eau usée, Pollution eau, Traitement eau, Station épuration, Analyse eau, Dosage, Protection environnement, France, Œstrogène

- PARVY (Philippe), SIGWALT (Claude), ROIG (Benoît), TOURAUD (Evelyne), TERNES (Thomas), LOEFFLER (Dirk), SCHLUESENER (Michael), et al.. Les effluents liquides dans les établissements de santé : état des lieux et perspectives de gestion (II). Dossier. TECHNIQUES HOSPITALIERES 2009/05-06;(715):44-90.

Ce numéro présente la deuxième partie des interventions du congrès sur les effluents liquides des établissements de santé qui s'est tenu à Chambéry le 26 et 27 novembre 2008 et qui avait pour objectif de faire le point sur les produits rejetés et retrouvés dans les effluents ainsi que sur les méthodes de traitement, à la source ou en station d'épuration. Les établissements de santé utilisent une grande variété de produits (antibiotiques, solvants, métaux lourds, radioéléments) mais aussi des produits d'hygiène et d'entretien, qui se retrouvent dans les eaux usées. Ces dernières peuvent également être chargées en micro-organismes. Tous ces produits se retrouvent au niveau de la station d'épuration qui, le plus souvent, met en oeuvre des processus microbiologiques de dégradation. L'efficacité de ces procédés sur la dégradation ou la rétention de ces produits est mal connue. Ces molécules peuvent se retrouver dans l'eau et dans les boues et, de fait, dans le milieu naturel. Le devenir des produits présents dans les rejets liquides des centres de soins voire du domicile de certains patients est une question émergente qui doit être abordée de manière coordonnée par les acteurs concernés. Après une première partie publiée dans le n° 714 de mars-avril 2009 qui établissait un état des lieux, cette deuxième partie présente les interventions relatives au traitement des effluents.

Mots-clés : Déchet, Déchet liquide, Déchet médical, Déchet hospitalier, Eau, usée, Pollution eau, Médicament, Médicament antibiotique, Médicament anticancéreux, Prion, Toxicité, Traitement eau, Station épuration, Boue station épuration, Boue activée, France, Europe, Santé environnementale ;

- PERRIN (Philippe), ANDRIEUX (Luc), BAURES (Estelle), HELIAS (Emmanuelle), LE BOT (Barbara), THOMAS (Olivier), et al.. Les effluents liquides dans les établissements de santé : état des lieux et perspectives de gestion (I). Dossier. TECHNIQUES HOSPITALIERES 2009/03-04;(714):12-66.

Ce numéro présente la première partie des interventions du congrès sur les effluents liquides des établissements de santé qui s'est tenu à Chambéry le 26 et 27 novembre 2008 et qui avait pour objectif de faire le point sur les produits rejetés et retrouvés dans les effluents ainsi que sur les méthodes de traitement, à la source ou en station d'épuration. En effet, les établissements de santé utilisent une grande variété de produits (antibiotiques, solvants, métaux lourds, radioéléments) mais aussi des produits d'hygiène et d'entretien, qui se retrouvent dans les eaux usées. Ces dernières peuvent également être chargées en micro-organismes. Tous ces produits se retrouvent au niveau de la station d'épuration qui, le plus souvent, met en oeuvre des processus microbiologiques de dégradation. L'efficacité de ces procédés sur la dégradation ou la rétention de ces produits est mal connue. Ces molécules peuvent se retrouver dans l'eau et dans les boues et, de fait, dans le milieu naturel. Le devenir des produits présents dans les rejets liquides des centres de soins voire du domicile de certains patients est une question émergente qui doit être abordée de manière coordonnée par les acteurs concernés. La première partie des interventions publiée dans ce numéro établit un état des lieux de la situation : nature des produits, résultats de prélèvements, culture des individus ou des institutions concernées en matière de pollution, évaluation des risques. La deuxième partie des interventions qui porte sur le traitement des effluents sera publiée dans le numéro n° 715 de mai-juin 2009.

Mots-clés : Déchet, Déchet liquide, Déchet médical, Déchet hospitalier, Eau usée, Pollution eau, Médicament, Médicament antibiotique, Médicament anticancéreux, Métal, Bactérie, Déchet radioactif, Médecine nucléaire, Radiothérapie, Toxicité, Mesure risque, Analyse eau, Personnel hospitalier, Représentation sociale, Santé environnementale, Hôpital, France, Maroc, Europe, Radioisotope, Rejet radioactif.

- Académie Nationale de Pharmacie. (A.N.P.). Paris. FRA. Médicaments et environnement. Paris : Académie nationale de pharmacie; 2008/09. http://www.bdsp.ehesp.fr/Fulltext/391842/

Élaboré par la Commission santé et environnement de l'Académie nationale de pharmacie, ce rapport soulève le problème de la présence de résidus médicamenteux dans l'environnement. Après un rappel sur le cycle de vie des substances médicamenteuses, de leur conception jusqu'à leur rejet et à leur biodégradation dans l'environnement, le rapport examine la nature de la contamination (atmosphère, sols, milieux aquatiques, aliments) ainsi que les sources diffuses ou ponctuelles de cette contamination (résidus du métabolisme, industrie, établissement de soins, élevage...). Puis, il évalue les risques pour l'environnement et pour l'homme en fonction des classes thérapeutiques des médicaments et fait le point sur les mesures actuelles de gestion des risques (réglementation en Europe et aux États-Unis, mesures de prévention...). En conclusion, l'Académie nationale de pharmacie formule une dizaine de recommandations en fonction de trois axes : limiter et contrôler les rejets, évaluer les risques liés aux rejets, développer des actions de formation et d'éducation.

Mots-clés : Médicament, Médicament vétérinaire, Contamination, Pollution, Pollution atmosphérique, Pollution sol, Pollution eau, Déchet, Déchet hospitalier, Déchet industriel, Déchet agricole, Déchet médical, Hôpital, Elevage, Industrie pharmaceutique, Mesure risque, Evaluation, Environnement, Etat santé, Polluant, Toxique, Nocivité, Gestion risque, Réglementation, Prévention, Recommandation, Santé environnementale, France, Molécule

- VIRLOUVET (Gaël). Résidus de médicaments dans les eaux : contribution des activités humaines et vétérinaires. ENVIRONNEMENT, RISQUES ET SANTE 2006/07-08;5(4):239-241. http://www.bdsp.ehesp.fr/Fulltext/344157/

Les résidus de médicaments retrouvés dans les eaux peuvent être liés au médicament humain ou vétérinaire. Ces deux origines possibles se distinguent aux plans quantitatif et qualitatif. En matière de résidus dans les eaux, les risques liés aux antiparasitaires vétérinaires se rapprochent de ceux des produits phytosanitaires. Enfin, les sources géographiques et la voie de contamination du milieu ne sont pas les mêmes entre médicaments humains et vétérinaires.

Mots-clés : Toxique, Eau, Pollution eau, Médicament vétérinaire, Médicament, Eau usée, Mesure risque, Déchet médical, Evacuation eau, Santé Environnementale

- FENET (Hélène), GOMEZ (Elena), LECLERC (Marie), CASELLAS (Claude). Devenir des médicaments dans l'environnement. ENVIRONNEMENT, RISQUES ET SANTE 2006/07-08;5(4):243-247.

http://www.bdsp.ehesp.fr/Fulltext/344158/

Après leur utilisation thérapeutique ou diagnostique, les médicaments ne sont pas toujours complètement métabolisés ; ainsi les médicaments humains et/ou leurs métabolites sont rejetés continuellement dans les eaux usées. Or les stations d'épuration ne permettent pas leur complète élimination. Les résidus de médicaments rejoignent ainsi le milieu récepteur, c'est-à-dire essentiellement les eaux de surface. Les médicaments sont, par ailleurs, des substances le plus souvent conçues pour être biologiquement actives. Elles peuvent ainsi interagir avec des cibles biologiques spécifiques. Dans le cadre du Programme national d'écotoxicologie (Enimed), certains médicaments ont été dosés en entrée et sortie de stations d'épuration des eaux usées ; les concentrations mesurées sont en accord avec la littérature. Cela suscite des interrogations sur les risques écologiques et sanitaires liés à la présence de résidus de médicaments dans les eaux.

Mots-clés : Pollution eau, Eau usée, Mesure risque, Médicament, Déchet, médical, Environnement, Toxique, Station épuration, Evacuation eau, Santé environnementale, Sécurité sanitaire

- BUDZINSKI (Hélène), TOGOLA (Anne). Présence des résidus de médicaments dans les différents compartiments du milieu aquatique. ENVIRONNEMENT, RISQUES ET SANTE 2006/07-08;5(4):248-253, tabl.

http://www.bdsp.ehesp.fr/Fulltext/344159/

Les substances pharmaceutiques appartiennent à la classe des contaminants émergents qui sont depuis peu étudiés dans les milieux naturels. Ces composés synthétiques d'usage très répandu, créés pour avoir un effet biologique thérapeutique, consommés en quantités très importantes, sont introduits dans le milieu aquatique via les stations d'épuration. Après la mise au point des différents protocoles d'analyse (phase dissoute, phase particulaire), un premier bilan de la contamination de différents systèmes aquatiques (Seine, Gironde, Loire, Adour, milieu marin côtier méditerranéen) a été dressé. Différentes techniques analytiques dans le domaine de l'analyse physico-chimique organique environnementale (GC/MS, extraction assistée par micro-ondes, SPE...), ont permis de mettre en évidence une réelle contamination du milieu aquatique par ces composés, quel que soit le système étudié. Les concentrations mesurées vont, selon les composés, les stations et les saisons de quelques ng/L à quelques dizaines de microg/L pour les eaux de rivière ou les eaux marines. Ces travaux démontrent clairement que le compartiment dissous est le plus contaminé mais également que les phases particulaire et sédimentaire peuvent également jouer un rôle non négligeable dans la distribution de ces composés dans l'environnement aquatique.

Mots-clés : Pollution eau, Médicament, Déchet médical, Environnement, Analyse eau, Eau marine, Produit pharmaceutique, Technique d'analyse, Impact, Ecosystème, Eau estuarienne, Eau douce

- ADAM (Christelle), DEBAYLE (Christophe), CAREL (Damien), CAVALIE (Isabelle). Les produits radiopharmaceutiques dans les effluents hospitaliers et domestiques. ENVIRONNEMENT, RISQUES ET SANTE 2006/07-08;5(4):254-260, tabl. http://www.bdsp.ehesp.fr/Fulltext/344161/

But : l'usage des radiopharmaceutiques à des fins diagnostiques ou thérapeutiques est susceptible d'induire le rejet d'effluents radioactifs dans les réseaux d'eaux usées. L'objectif de cette étude est d'identifier et de quantifier la présence de radionucléides associés à ces pratiques médicales dans les stations d'épuration, ainsi que d'estimer leur impact sur les écosystèmes aquatiques. Méthodes : le suivi de la radioactivité dans les stations d'épuration a été effectué par prélèvements moyens ou à l'aide d'une sonde de mesure gamma en continu. Des études en laboratoire ont ensuite été conduites sur des poissons afin d'évaluer l'impact environnemental de deux radiopharmaceutiques largement utilisés. Résultats : les radio-isotopes détectés dans les stations d'épuration sont l'iode 131 et le technétium 99m. L'irrégularité des pics d'activité ne permettant pas d'effectuer des prélèvements moyens sur 24 heures pour le suivi des rejets, un suivi en continu est préconisé. Dans le cas des études en laboratoire, les deux composés iodés étudiés sont l'iodure de sodium (NaI) et la m-iodobenzylguanidine (MIBG). Les résultats montrent que le NaI est distribué dans les follicules thyroïdiens tandis que la MIBG se retrouve dans les tissus fortement innervés. Ces composés sont éliminés rapidement (environ 80% en 2 jours) et aucune génotoxicité des produits n'a été mise en évidence aux doses analysées.

Mots-clés : Pollution eau, Déchet médical, Produit pharmaceutique, Eau usée, Iode, Déchet radioactif, Médecine nucléaire, Toxique, Poisson, Mesure radioactivité, Mesure risque, Environnement, Impact, Ecosystème, Evacuation Eau.

- LEVI (Yves). Inquiétudes sur la présence d'antibiotiques et de bactéries antibiorésistantes dans les eaux. ENVIRONNEMENT, RISQUES ET SANTE 2006/07-08;5(4):261-265, tabl., fig. http://www.bdsp.ehesp.fr/Fulltext/344163/

L'usage intensif des antibiotiques en médecine humaine et vétérinaire présente deux conséquences en matière d'impact environnemental : la présence de résidus de molécules actives et la pression de sélection de bactéries antibiorésistantes. Ces deux phénomènes sont associés mais ne présentent pas les mêmes interrogations en matière de risque sanitaire et de mesures de gestion de la qualité des eaux. Les résidus d'antibiotiques doivent, comme les autres micropolluants organiques indésirables, pouvoir être éliminés dans les filières de potabilisation, mais il importe également d'évaluer leur impact sur la biomasse active des filières d'assainissement ou sur l'écologie microbienne des sols. Une action préventive est indispensable pour réduire les quantités utilisées et les émissions dans l'environnement. Les bactéries antibiorésistantes existent naturellement dans de nombreuses ressources en eau, même dans des zones géographiques sans véritable pression d'usage d'antibiotiques. D'autres sont diffusées à partir des zones de sélection prioritaires telles que les élevages ou les établissements de soins. Il importe de développer la connaissance sur leur devenir au sein des boues activées et sur leur capacité à transmettre la résistance aux biomasses des eaux. Les désinfections réalisées dans les usines de potabilisation constituent des étapes de protection pour l'eau potable. L'analyse globale et complexe du risque doit être faite en intégrant les diverses expositions (contact, aérosols, eau, aliments) notamment pour réduire le nombre d'infections nosocomiales.

Mots-clés : Pollution eau, Déchet médical, Eau usée, Toxique, Mesure risque, Environnement, Médicament antibiotique, Pharmacorésistance, Impact, Ecosystème, Bactérie, Evacuation eau, Sécurité sanitaire, Santé

Environnementale;

- LAVILLE (Nathalie), AIT-AISSA (Sélim), CASELLAS (Claude), PORCHER (Jean-Marc). Application de modèles in vitro à l'étude des effets des médicaments chez les poissons. ENVIRONNEMENT, RISQUES ET SANTE 2006/07-08;5(4):284-289, tabl. http://www.bdsp.ehesp.fr/Fulltext/344168/

La pollution de l'environnement aquatique par les produits pharmaceutiques pose la question des effets potentiels de ces composés biologiquement actifs Sur les organismes non-cibles tels que les poissons. Compte tenu non seulement du manque de données sur l'écotoxicité des médicaments, des spécificités physiologiques et métaboliques des espèces aquatiques, mais aussi du nombre important de substances actives retrouvées dans les eaux de surface, les modèles cellulaires de poisson sont pressentis comme de bons outils de criblage pour évaluer les effets des médicaments chez ces organismes. Dans cet article, l'intérêt de ces modèles en écotoxicologie est présenté à travers l'exemple de plusieurs études récentes rapportant l'utilisation de modèles cellulaires ichtyens (cultures primaires, lignées cellulaires génétiquement modifiées ou non) pour l'évaluation de la cytotoxicité et des mécanismes d'action (effets métaboliques, stress oxydant, perturbation endocrinienne) des substances pharmaceutiques.

Mots-clés : Modèle, Expérimentation animale, Toxique, Poisson, Pollution eau, Médicament, Mesure risque, Déchet médical, Eau, Environnement, In vitro ;

- MONTIEL (Antoine). Les résidus de médicaments et le traitement des effluents d'hôpitaux. ENVIRONNEMENT, RISQUES ET SANTE 2006/07-08;5(4):296-300, tabl.,fig.

http://www.bdsp.ehesp.fr/Fulltext/344178/

Les résidus de médicaments de la médecine humaine ou vétérinaire sont employés partout dans le monde. Cependant, ce n'est que très récemment que ces composés ont pu être dosés et, avec cette mise en évidence, ont attiré l'attention des responsables de l'environnement au niveau de leurs interactions sur la faune et la flore aquatiques et surtout des utilisateurs d'eaux de surface pour la production d'eau potable. Ces composés ont pour origine, d'une part les rejets de stations d'épuration et, d'autre part, les rejets d'élevage ou le ruissellement d'eaux sur des sols ayant reçu des lisiers. Si les stations d'épuration n'ont pas été conçues pour éliminer ces composés, on constate cependant que beaucoup de ces composés sont bien éliminés soit par adsorption soit par biodégradation ; cependant, certaines molécules passent au travers de ces différentes barrières et se retrouvent dans le milieu naturel. Certaines de ces molécules sont essentiellement rejetées par des établissements de soins (hôpitaux, cliniques). Après avoir passé en revue toutes les techniques utilisables pour la rétention ou la transformation de ces molécules, il est proposé, pour les sites à haut risque (établissements de soins), de faire de la séparation à la source pour éviter les dilutions qui gênent la bonne épuration des eaux. La séparation des urines est une voie prometteuse puisque ces molécules se retrouvent préférentiellement dans les urines. À ce niveau, et compte tenu des faibles volumes, des traitements sophistiqués et onéreux tels l'osmose inverse et la destruction des concentras à très haute température peuvent être mis en oeuvre.

Mots-clés : Pollution eau, Produit pharmaceutique, Médicament, Environnement, Déchet médical, Eau usée, Traitement déchet, Station épuration, Technique traitement, Urine, Evacuation eau

- JOYEUX (Michel). Résidus médicamenteux et risques sanitaires d'origine hydrique. ENVIRONNEMENT, RISQUES ET SANTE 2006/07-08;5(4):301-306, tabl. http://www.bdsp.ehesp.fr/Fulltext/344179/

Les activités humaines et industrielles sont à l'origine du rejet d'un grand nombre de substances chimiques dans les milieux hydriques. Jusqu'à une période récente, réglementations et programmes de surveillance de la qualité de l'eau ont essentiellement porté sur des composés utilisés par l'industrie ou par l'agriculture. De nouvelles problématiques sont actuellement en émergence, notamment la présence, de plus en plus constante, de certains résidus médicamenteux au niveau d'eaux de surface susceptibles d'être utilisées dans la préparation d'eaux destinées à la consommation humaine. Le caractère spécifique de ces composés, mis sur le marché au terme d'une sélection rigoureuse ne retenant que les molécules biologiquement les plus actives, leur confère un statut particulier, bien que ces substances soient retrouvées dans les milieux hydriques à des concentrations très faibles. Les progrès réalisés dans le domaine analytique font que la présence de résidus médicamenteux dans certaines ressources destinées à fournir les eaux de distribution est aujourd'hui un fait avéré. Malgré les concentrations faibles actuellement détectées, il est légitime de s'interroger sur l'impact sociétal ainsi que sur les conséquences sanitaires potentielles d'une telle présence. D'importants travaux restent à mener afin de mieux caractériser les dangers et l'exposition liés à ces substances en précisant notamment leur niveau d'émission, leurs capacités de transformation dans les filières de traitement et leurs impacts sur les milieux. Bien que les marges d'exposition semblent, a priori, acceptables pour protéger les consommateurs, l'évaluation des risques sanitaires reste un exercice délicat et s'appuie sur des approches indirectes qui présentent des limites certaines. Il convient en particulier d'améliorer nos connaissances sur les conséquences des expositions à très faibles doses en redéfinissant au besoin l'effet cible initialement retenu dans des expérimentations classiques, de mieux appréhender les autres voies d'exposition afin d'établir la part relative de différentes sources et d'approfondir les recherches sur les interactions dues à la présence d'autres composés dans le milieu hydrique. La multiplication des mesures

analytiques ne permettra pas à elle seule de répondre à cette problématique dont certains aspects ne pourront être approchés que par l'intermédiaire d'outils biologiques qui demeurent, à ce jour, encore trop rarement utilisés dans ce cadre.

Mots-clés : Pollution eau, Médicament, Environnement, Déchet médical, Produit pharmaceutique, Mesure risque, Exposition, Dose effet, Technique d'analyse, Santé environnementale, Sécurité sanitaire, Surveillance environnement.

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Parmi les résidus médicamenteux ou cosmétiques trouvés dans les eaux usées et le milieu récepteur vont bientôt figurer ceux issus des applications des nanotechnologies. Les nouvelles formulations ont pour objectif d'augmenter la solubilité de molécules peu solubles, de prolonger le temps de résidence et de transporter la molécule active au niveau des sites cibles de son action. Il est déjà bien difficile d'évaluer les effets des résidus de médicaments classiques dans le milieu récepteur, il serait encore plus aléatoire de chercher à le faire pour ce type de molécules, dont certaines semblent cependant déjà fort répandues au niveau de la cosmétologie. En conséquence, un effort de recherche est nécessaire pour mieux connaître la part relarguée dans l'environnement, la forme chimique dans les eaux et l'éventuelle toxicité sur les espèces animales hydriques.

Mots-clés : Pollution eau, Médicament, Environnement, Déchet médical, Produit pharmaceutique, Mesure risque, Eau usée, Toxique, Cosmétique, Innovation technologique, Santé environnementale, Sécurité sanitaire, Surveillance environnement, Evacuation eau.

- CASELLAS (Claude), VIRLOUVET (Gaël), FENET (Hélène), et al.. Dossier : Risques écologiques et sanitaires des résidus de médicaments dans les eaux. Rapprocher Science et Décision. ENVIRONNEMENT, RISQUES ET SANTE 2006/07-08;5(4):239-328, tabl., fig. http://www.bdsp.ehesp.fr/Fulltext/344185/

Un phénomène nouveau soulève de plus en plus de questions à l'échelle internationale et commence à être pris en considération en France : la contamination des eaux induite par les résidus de médicaments à usages humain et vétérinaire. Les médicaments sont des molécules généralement conçues pour être biologiquement actives et la question de leurs effets potentiels sur des organismes non-ciblés et sur les populations est posée. Ce dossier est consacré à la restitution des communications présentées lors du colloque "Risques écologiques et sanitaires des résidus de médicament dans les eaux", colloque qui a fait le point, au plan national, sur les connaissances acquises en termes d'évaluation et de gestion des risques.

Mots-clés : Médicament, Environnement, Produit pharmaceutique, Mesure risque, Toxique, Pollution chimique, Protection environnement, Cosmétique, Pollution eau, Eau marine, Eau usée, Déchet médical, Impact, Ecosystème, Santé environnementale, Sécurité sanitaire, Surveillance environnement, Evacuation eau.

EHESP - Service Documentation - Export BDSP, 6 juin 2016, G. Chevaillier

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II- Recherche Sciencedirect :

("Waste Water" AND ("Medical Waste" OR "pharmaceutical preparations" OR "water pollutants") AND (Hospitals OR Cities) AND ("Water Purification" OR Decontamination OR Filtration))

60 références

- Dagmar Haase, Reflections about blue ecosystem services in cities, Sustainability of Water Quality and Ecology, Volume 5, March 2015, Pages 77-83, ISSN 2212-6139, http://dx.doi.org/10.1016/j.swaqe.2015.02.003.

(http://www.sciencedirect.com/science/article/pii/S2212613915000112)

Abstract: Abstract

Water is of particular importance for cities. Many fast growing megacities are facing serious water-related problems including pollution, eutrophication, missing wastewater treatment and, perhaps most importantly, a severe scarcity of clean water. In the entire urban world, water resources are used in an inefficient way. But there is great potential: this opinion paper discusses ecosystem services provided by waters—hereafter referred to as blue urban ecosystem services—and respective links to green infrastructure and the services they provide for human wellbeing. The messages given illustrate avenues for future research that might help to develop nature-based solutions for water-related challenges in urban regions.

Keywords: Urban waters; Ecosystem services; Blue–green infrastructure; Cities

- Michael G. Holland, David Cawthon, Personal Protective Equipment and Decontamination of Adults and Children, Emergency Medicine Clinics of North America, Volume 33, Issue 1, February 2015, Pages 51-68, ISSN 0733-8627, http://dx.doi.org/10.1016/j.emc.2014.09.006.

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Keywords: Decontamination; Personal protective equipment (PPE); Levels A, B, C, D; HAZMAT; Chemical contamination

- Nitin Vyas, Andrew Turner, Graham Sewell, Platinum-based anticancer drugs in waste waters of a major UK hospital and predicted concentrations in recipient surface waters, Science of The Total Environment, Volume 493, 15 September 2014, Pages 324-329, ISSN 0048-9697, http://dx.doi.org/10.1016/j.scitotenv.2014.05.127.

(http://www.sciencedirect.com/science/article/pii/S0048969714008195)

Abstract: Abstract

Concentrations of the cytotoxic platinum-based anticancer drugs, as total Pt, have been measured over a three week period in one of the main drains and in the effluent of the oncology ward of a major UK hospital (Derriford, Plymouth). Concentrations of

Pt were highly variable in both discharges, and ranged from about 0.02 to 140 μg L− 1 in the oncology effluent and from about 0.03 to 100 μg L− 1 in the main drain. A comparison of drug administration figures over the study period with an estimate of the quantity of Pt discharged through the drains suggests that about 22% of total Pt is emitted to the environment from the hospital with the remainder being discharged by treated patients in the wider community. Administration figures for the three Pt-based drugs used in the hospital (cisplatin, carboplatin and oxaliplatin) coupled with published measurements on the removal of the drugs by conventional sewage treatment allowed the concentrations of Pt arising from each drug to be predicted in recipient surface waters as a function of water flow rate. For conditions representative of the region under study, concentrations of total Pt between a few tens and in excess of 100 pg L− 1 are predicted, with the principal form of the metal occurring as carboplatin and its metabolites. Although predicted concentrations are below EMEA guidelines warranting further risk assessment, the presence of substances in surface waters that are potentially carcinogenic, mutagenic and teratogenic and yet whose environmental effects are not understood is cause for concern.

Keywords: Platinum; Cytotoxic drugs; Metabolites; Hospital waste; Environmental concentrations

- E. Elimelech, O. Ayalon, B. Flicstein, Hazardous waste management and weight-based indicators—The case of Haifa Metropolis, Journal of Hazardous Materials, Volume 185, Issues 2–3, 30 January 2011, Pages 626-633, ISSN 0304-3894, http://dx.doi.org/10.1016/j.jhazmat.2010.09.064.

(http://www.sciencedirect.com/science/article/pii/S0304389410012252)

Abstract: The quantity control of hazardous waste in Israel relies primarily on the Environmental Services Company (ESC) reports. With limited management tools, the Ministry of Environmental Protection (MoEP) has no applicable methodology to confirm or monitor the actual amounts of hazardous waste produced by various industrial sectors. The main goal of this research was to develop a method for estimating the amounts of hazardous waste produced by various sectors. In order to achieve this goal, sector-specific indicators were tested on three hazardous waste producing sectors in the Haifa Metropolis: petroleum refineries, dry cleaners, and public hospitals. The findings reveal poor practice of hazardous waste management in the dry cleaning sector and in the public hospitals sector. Large discrepancies were found in the dry cleaning sector, between the quantities of hazardous waste reported and the corresponding indicator estimates. Furthermore, a lack of documentation on hospitals' pharmaceutical and chemical waste production volume was observed. Only in the case of petroleum refineries, the reported amount was consistent with the estimate.

Keywords: Hazardous waste; Indicators; Dry cleaners; Hospitals; Petroleum refineries

- Huub J. Gijzen, The role of natural systems in urban water management in the City of the Future - A 3-step strategic approach, Ecohydrology & Hydrobiology, Volume 6, Issues 1–4, 2006, Pages 115-122, ISSN 1642-3593, http://dx.doi.org/10.1016/S1642-3593(06)70133-1.

(http://www.sciencedirect.com/science/article/pii/S1642359306701331)

Abstract: UWM should be considered within the wider context of sustainable development. This means that a holistic approach must be followed, where the management of urban water services is linked to that of water resources and of nutrients. It also means that interventions should not be focussed exclusively at 'the end of the pipe', which is extremely costly and ineffective. By applying the principles of cleaner production, we propose the so-called 3-Step Strategic Approach for UWM. The three steps include 1) pollution prevention and minimisation, 2) treatment for reuse, and 3) stimulation of the self-purification capacity of the receiving environment. Examples of possible interventions under each step will be given. The overall aim is to achieve sustainable UWM and nutrient management. Natural systems and processes play a crucial role in the implementation of this strategy. We should therefore aim at maximizing the exploitation of natural systems and processes for

the effective management of municipal water resources (water quality), of water supply and sanitation services, and of the municipal water cycle as a whole (water quantity).

Key words: Cleaner Production; Millennium Development Goals; Sewage treatment; natural processes and systems

- Jiunn-Der Duh, Vivek Shandas, Heejun Chang, Linda A. George, Rates of urbanisation and the resiliency of air and water quality, Science of The Total Environment, Volume 400, Issues 1–3, 1 August 2008, Pages 238-256, ISSN 0048-9697, http://dx.doi.org/10.1016/j.scitotenv.2008.05.002.

(http://www.sciencedirect.com/science/article/pii/S0048969708005068)

Abstract: Global human population and urban development are increasing at unprecedented rates and creating tremendous stress on local, regional, and global air and water quality. However, little is known about how urban areas vary in their capacity to address effectively air and water quality impacts associated to urban development. There exists a need to better understanding the factors that mediate the interactions between urbanisation and variations of environmental quality. By synthesizing literatures on the relationship between urban development and air and water quality, we assess the amount of scholarship for each of these cities, characterize population growth rates in one hundred of the largest global cities, and link growth trends to changes in air and water quality. Our results suggest that, while there is a growing literature linking urbanisation and environmental quality, some regions of the globe are better represented than others, and that these trends are consistent with our characterization of population growth rates. In addition, the comparison between population growth rates and air and water quality suggest that multiple factors affect the environmental quality, and that approaching rates of urbanisation through the lens of 'resiliency' can be an effective integrative concept for studying the capacity of urban areas to respond to rapid rates of change. Based on these results we offer a framework for systematically assessing changes in air and water quality in megacities.

Keywords: Resiliency; Rapid urbanisation; Air quality; Water quality; Megacities

- Sylvie Buffet-Bataillon, Pierre Tattevin, Martine Bonnaure-Mallet, Anne Jolivet-Gougeon, Emergence of resistance to antibacterial agents: the role of quaternary ammonium compounds—a critical review, International Journal of Antimicrobial Agents, Volume 39, Issue 5, May 2012, Pages 381-389, ISSN 0924-8579, http://dx.doi.org/10.1016/j.ijantimicag.2012.01.011.

(http://www.sciencedirect.com/science/article/pii/S0924857912000520)

Abstract: Quaternary ammonium compounds (QACs) are widely distributed in hospitals, industry and cosmetics. Little attention has been focused on the potential impact of QACs on the emergence of antibiotic resistance in patients and the environment. To assess this issue, we conducted a literature review on QAC chemical structure, fields of application, mechanism of action, susceptibility testing, prevalence, and co- or cross-resistance to antibiotics. Special attention was paid to the effects of QACs on microflora; in particular, the issue of the potential of QACs for applying selective pressure on multiple-antibiotic-resistant organisms was raised. It was found that there is a lack of standardised procedures for interpreting susceptibility test results. QACs have different impacts on the minimum inhibitory concentrations of antibacterials depending on the antibacterial compound investigated, the resistance genes involved, the measuring methodology and the interpretative criteria. The unmet needs for adequate detection of reduced susceptibility to QACs and antibiotics include (i) a consensus definition for resistance, (ii) epidemiological cut-off values and (iii) clinical resistance breakpoints. This review advocates the design of international guidelines for QAC use.

Keywords: Quaternary ammonium compounds; Minimum inhibitory concentration; Resistance; Antimicrobial agents; Microflora

- J. Wang, X.D. Liu, J. Lu, Urban River Pollution Control and Remediation, Procedia Environmental Sciences, Volume 13, 2012, Pages 1856-1862, ISSN 1878-0296, http://dx.doi.org/10.1016/j.proenv.2012.01.179.

(http://www.sciencedirect.com/science/article/pii/S1878029612001806)

Abstract: As an important subsystem of urban environment, urban river offers many kinds of ecological services which benefit the city dwellers. However, with the acceleration of urbanization and rapid development of economy, urban river pollution problem are becoming more and more critical. This paper described the current situation of urban river pollution, summarized the researches on river pollution control and remediation. After compared and analyzed different techniques and clarified the concepts of bioremediation technology, based on the advances of river remediation, this paper concluded the approaches to alleviate the river pollution problem that the biological-ecological remediation should be utilized as the primary technique, and the physical and chemical remediation as the supplementary means.

Keywords: River pollution control; Physical remediation; Chemical remediation; Bioremediation

- Stephen W. Borron, Checklists for Hazardous Materials Emergency Preparedness, Emergency Medicine Clinics of North America, Volume 33, Issue 1, February 2015, Pages 213-232, ISSN 0733-8627, http://dx.doi.org/10.1016/j.emc.2014.09.013.

(http://www.sciencedirect.com/science/article/pii/S0733862714000832)

Keywords: Checklist; Emergency management plan; Hazard vulnerability analysis; Human resources; Antidote stocking; Personal protective equipment

- Valeska Contardo-Jara, Lucas N. Galanti, María V. Amé, Magdalena V. Monferrán, Daniel A. Wunderlin, Claudia Wiegand, Biotransformation and antioxidant enzymes of Limnoperna fortunei detect site impact in watercourses of Córdoba, Argentina, Ecotoxicology and Environmental Safety, Volume 72, Issue 7, October 2009, Pages 1871-1880, ISSN 0147-6513, http://dx.doi.org/10.1016/j.ecoenv.2009.07.001.

(http://www.sciencedirect.com/science/article/pii/S0147651309001419)

Abstract: The golden mussel Limnoperna fortunei was used as a biomonitor of environmental pollution in the Suquía River basin around Córdoba City (Argentina). The sampling sites along the river were chosen according to their increasing levels of pollutants (e.g. heavy metals) as well as biological oxygen demand (BOD) and chemical oxygen demand (COD). A water quality index (WQI) was constructed from the interaction of several normalized factors that affect the aquatic environment, such as the mentioned pollutants and physico-chemical characteristics of the sampling sites. Activity changes of biotransformation enzyme glutathione S-transferase (GST) and the antioxidant enzymes glutathione peroxidase (GPx), glutathione reductase (GR) and catalase (CAT), after exposure to pollutants, served as biomarkers. Membrane bound GST and antioxidant enzymes responded at the most polluted sampling site within 1 day showing increased activities lasting for 4 days. Further sampling was restricted due to no survival of the animals. Antioxidant enzymes GPx, GR and CAT were sensitive responding to the different pollution scenarios, showing good correlation to the chemical characterization.

Keywords: Biomarker; Glutathione S-transferase; Glutathione peroxidase; Catalase; Urban watercourses; Water quality; Golden mussel; Biomonitoring; Biotransformation; Oxidative stress

-Anna Weiss, Hannah M. Hollandsworth, Adnan Alseidi, Lauren Scovel, Clare French, Ellen L. Derrick, Daniel Klaristenfeld, Environmentalism in surgical practice, Current Problems in Surgery, Volume 53, Issue 4, April 2016, Pages 165-205, ISSN 0011-3840, http://dx.doi.org/10.1067/j.cpsurg.2016.02.001.

(http://www.sciencedirect.com/science/article/pii/S0011384016000137)

- Akhtar Malik Muhammad, Tang Zhonghua, Ammar Salman Dawood, Bailey Earl, Evaluation of local groundwater vulnerability based on DRASTIC index method in Lahore, Pakistan, Geofísica Internacional, Volume 54, Issue 1, January–March 2015, Pages 67-81, ISSN 0016-7169, http://dx.doi.org/10.1016/j.gi.2015.04.003.

(http://www.sciencedirect.com/science/article/pii/S0016716915000045)

Abstract: Abstract

Groundwater vulnerability assessment shows an extreme sensitivity to in situ anthropogenic pollutants. A dichotomous assessment of geological and hydrological (inter alia) characteristics makes it possible to determine the vulnerability of an aquifer. The natural carrying capacity of aquifer can be severely compromised by human activities. The physical structure and material composition of aquifers shows resistance to contaminants transport from surface to water-table. Currently, numerous methods have been posited evaluating aquifer's vulnerability. Similarly the DRASTIC model utilizes computer algorithms and hydro-geological data within a Geographical Information System (GIS) environment to compute aquifer vulnerability.

The degree of vulnerability for each parameter can be evaluated by computing sensitivity analysis of DRASTIC index using GIS, showing the contribution of each parameter to vulnerability sensitivity. The GIS was used to developed map which showed high risk area of 28.8% and moderately vulnerable areas of 46.3% while areas of no risk were 10.4%. Central regions within the study area showed low vulnerability due to dense human settlement and low water level. However, pasture type lands and agricultural areas recorded high risk.

Lahore's environmental and socio-economic development is dependent on policy makers and planner's ability to use information effectively for decision making. The resultant groundwater vulnerability map provides a basis for this aimed at protecting the aquifer from pollutants. Additionally, land use and development activities can be informed by mapping variables, showing that industrial and agriculture areas are highly vulnerable as compare to settlement areas.

Palabras clave: Aquífero; modelo DRASTIC; GIS; aguas subterráneas; Lahore; vulnerabilidad.; aquifer; DRASTIC model; GIS; groundwater; Lahore; vulnerability.

- Kyung-Taek Rim, Cheol-Hong Lim, Biologically Hazardous Agents at Work and Efforts to Protect Workers' Health: A Review of Recent Reports, Safety and Health at Work, Volume 5, Issue 2, June 2014, Pages 43-52, ISSN 2093-7911, http://dx.doi.org/10.1016/j.shaw.2014.03.006.

(http://www.sciencedirect.com/science/article/pii/S2093791114000249)

Abstract: Abstract

Because information on biological agents in the workplace is lacking, biological hazard analyses at the workplace to securely recognize the harmful factors with biological basis are desperately needed. This review concentrates on literatures published after 2010 that attempted to detect biological hazards to humans, especially workers, and the efforts to protect them against these factors. It is important to improve the current understanding of the health hazards caused by biological factors at the workplace. In addition, this review briefly describes these factors and provides some examples of their adverse health effects. It also reviews risk assessments, protection with personal protective equipment, prevention with training of workers, regulations, as well as vaccinations.

Keywords: biological agents; health; occupational; protection; workers

- Monica Magureanu, Nicolae Bogdan Mandache, Vasile I. Parvulescu, Degradation of pharmaceutical compounds in water by non-thermal plasma treatment, Water Research, Volume 81, 15 September 2015, Pages 124-136, ISSN 0043-1354, http://dx.doi.org/10.1016/j.watres.2015.05.037.

(http://www.sciencedirect.com/science/article/pii/S0043135415300208)

Abstract: Abstract

Pharmaceutical compounds became an important class of water pollutants due to their increasing consumption over the last years, as well as due to their persistence in the environment. Since conventional waste water treatment plants are unable to remove certain non-biodegradable pharmaceuticals, advanced oxidation processes was extensively studied for this purpose. Among them, non-thermal plasma was also recently investigated and promising results were obtained. This work reviews the recent research on the oxidative degradation of pharmaceuticals using non-thermal plasma in contact with liquid. As target compounds, several drugs belonging to different therapeutic groups were selected: antibiotics, anticonvulsants, anxiolytics, lipid regulators, vasodilatators, contrast media, antihypertensives and analgesics. It was found that these compounds were removed from water relatively fast, partly degraded, and partly even mineralized. In order to ensure the effluent is environmentally safe it is important to identify the degradation intermediates and to follow their evolution during treatment, which requires complex chemical analysis of the solutions. Based on this analysis, degradation pathways of the investigated pharmaceuticals under plasma conditions were suggested. After sufficient plasma treatment the final organic by-products present in the solutions were mainly small molecules in an advanced oxidation state.

Keywords: Non-thermal plasma; Pharmaceutical compounds; Water treatment; Degradation; Advanced oxidation processes

- William K. Reisen, Medical entomology – Back to the future?, Infection, Genetics and Evolution, Volume 28, December 2014, Pages 573-582, ISSN 1567-1348, http://dx.doi.org/10.1016/j.meegid.2013.11.025.

(http://www.sciencedirect.com/science/article/pii/S1567134813004413)

Abstract: Abstract

Some of problems and challenges facing Medical/Veterinary Entomology are presented from my perspective, focusing on the current millennium. Topics include anthropogenic environmental changes created by population growth, administrative problems hindering science's response to these changes, and some of the scientific discoveries potentially providing solutions. As the title implies, many recent research discoveries have yet to be translated into major changes in control approaches for the major vectorborne public health problems, thereby providing an interesting mix of modern surveillance technology used to track problems and direct historical intervention solutions.

Keywords: Medical entomology; Future and past; Demography; Anthropogenic environmental change; Problems and solutions

- S.R. Asolekar, P.P. Kalbar, M.K.M. Chaturvedi and K.Y. Maillacheruvu, 4.10 - Rejuvenation of Rivers and Lakes in India: Balancing Societal Priorities with Technological Possibilities, In Comprehensive Water Quality and Purification, edited by Satinder Ahuja,, Elsevier, Waltham, 2014, Pages 181-229, ISBN 9780123821836, http://dx.doi.org/10.1016/B978-0-12-382182-9.00075-X.

(http://www.sciencedirect.com/science/article/pii/B978012382182900075X)

Abstract: Abstract

In the light of shortage of water in several parts of the World, especially in the developing country like India and in the context of the prevailing policy of accelerating growth through industrialization, there is an eminent need for devising newer approaches of water management. Various innovative successful approaches have been discussed which balanced societal priorities with feasible treatment technologies particularly focusing on natural treatment systems (NTS's). It has been argued that the NTS's can be effectively combined with advanced tertiary treatment alternatives and resulting high quality treated effluents can be gainfully recycled into production and sanitation applications. The dimensions of sustainability, stakeholder satisfaction, appropriate technologies, regulatory frameworks, governing institutions, and financial models have also been discussed.

Keywords: Community participation; Constructed wetland; Duckweed pond; Ganga river; India; Lake; Natural treatment system; Pollution; Public–private partnership; Rejuvenation of lake; Rejuvenation of river; Recycle; Reuse; River; Sewage-fed aquaculture; Sustainable development; Treatment plant; Waste stabilization pond

- .I. Bickley, M.J. Slater, W.-J. Wang, Engineering Development of a Photocatalytic Reactor for Waste Water Treatment, Process Safety and Environmental Protection, Volume 83, Issue 3, May 2005, Pages 205-216, ISSN 0957-5820, http://dx.doi.org/10.1205/psep.04028.

(http://www.sciencedirect.com/science/article/pii/S0957582005712398)

Abstract: Asimple design of photocatalytic reactor is proposed based on a study of the use of a suspension of relatively large titanium dioxide catalyst particles (ca. 10 to 100 µm) which can be separated from treated waste water using a hydrocyclone. Upward flow of suspension through an array of ultraviolet lamps and cooling tubes positioned horizontally is recommended. Flow rate is determined by residence time requirements to suit the kinetics. This design can be easily scaled up in modular form. The absorption or extinction of light of appropriate wavelengths by glass, water, pollutant and catalyst particles of different sizes at various concentrations has been measured to allow determination of catalyst concentration and suspension thickness required to obtain near total extinction of light. A rate equation is proposed which shows the part played by the very many factors involved and provides a new and coherent view of the complex interactions of the variables. The reactor design methodology is given.

Keywords: photocatalyst; titanium dioxide; water treatment; ultraviolet; reactor design

- Marek Trojanowicz, Flow-injection analysis as a tool for determination of pharmaceutical residues in aqueous environment, Talanta, Volume 96, 15 July 2012, Pages 3-10, ISSN 0039-9140, http://dx.doi.org/10.1016/j.talanta.2011.12.081.

(http://www.sciencedirect.com/science/article/pii/S0039914012000069)

Abstract: Numerous reported applications of flow-injection analytical methods in pharmaceutical analysis concern quality control of pharmaceutical preparations, investigation of dissolution of particular formulations and process control of production of pharmaceuticals. In recent decades an important environmental problem is increasing level of pharmaceutical residues in aqueous environment. The analytical determination of those residual compounds requires of the use a very selective method of a very low limit of detection. Appropriate selection of extraction and preconcentration methods for on-line sample processing and suitable detection allows the development of flow-injection analysis methods for such analyses. Especially satisfactory for this purpose is the application of a measuring system combining flow-injection systems for on-line sample processing with liquid chromatography.

Keywords: Flow-injection analysis; HPLC; Pharmaceutical residues; Environmental analysis

- S. Mompelat, B. Le Bot, O. Thomas, Occurrence and fate of pharmaceutical products and by-products, from resource to drinking water, Environment International, Volume 35, Issue 5, July 2009, Pages 803-814, ISSN 0160-4120, http://dx.doi.org/10.1016/j.envint.2008.10.008.

(http://www.sciencedirect.com/science/article/pii/S0160412008002225)

Abstract: Among all emerging substances in water, pharmaceutical products (PPs) and residues are a lot of concern. These last two years, the number of studies has increased drastically, however much less for water resources and drinking water than for wastewater. This literature review based on recent works, deals with water resources (surface or groundwater), focusing on characteristics, occurrence and fate of numerous PPs studied, and drinking water including water quality. Through this review, it appears that the pharmaceutical risk must be considered even in drinking water where concentrations are very low. Moreover, there is a lack of research for by-products (metabolites and transformation products) characterization, occurrence and fate in all water types and especially in drinking water.

Keywords: Pharmaceutical products; By-products; Drinking water; Water resources

- Jennifer L. Molnar, Ida Kubiszewski, Managing natural wealth: Research and implementation of ecosystem services in the United States and Canada, Ecosystem Services, Volume 2, December 2012, Pages 45-55, ISSN 2212-0416, http://dx.doi.org/10.1016/j.ecoser.2012.09.005.

(http://www.sciencedirect.com/science/article/pii/S2212041612000319)

Abstract: The United States and Canada have vast stores of ecological wealth that provide often unseen but critical benefits to the people and economy of each country. The close ties between ecology and the economy make it urgent that action is taken to address the risks of ecosystem degradation, but these close ties also present opportunities to develop new incentives for ecosystem conservation. To highlight the diversity of approaches being implemented in the US and Canada, we describe examples of programs seeking to maintain ecosystem services from wetlands, agricultural lands, forests, and water quality. Corporations are also beginning to account for ecosystem service values. Innovative solutions are being developed mostly within existing government and corporate policies that allow for ecosystem service accounting. To further mainstream ecosystem service values into broader economic decisions, new policies are necessary that not only allow but mandate their inclusion in decisions and reporting.

Keywords: Ecosystem services; United States; Canada; Implementation; Industry; Decision-making

- Christian G. Daughton, Pharmaceuticals and the Environment (PiE): Evolution and impact of the published literature revealed by bibliometric analysis, Science of The Total Environment, Volume 562, 15 August 2016, Pages 391-426, ISSN 0048-9697, http://dx.doi.org/10.1016/j.scitotenv.2016.03.109.

(http://www.sciencedirect.com/science/article/pii/S0048969716305320)

Abstract: Abstract

The evolution and impact of the published literature surrounding the transdisciplinary, multifaceted topic of pharmaceuticals as contaminants in the environment is examined for the first time in an historical context. The preponderance of literature cited in this examination represents the earlier works. As an historical chronology, the focus is on the emergence of key, specific aspects of the overall topic (often termed PiE) in the published literature and on the most highly cited works. This examination is not a conventional, technical review of the literature; as such, little attention was devoted to the more recent literature.

The many dimensions involved with PiE span over 70 years of published literature. Some articles began to appear in published works in the 1940s and earlier, while others only began to receive attention in the 1990s and later. Decades of early research on what at the time seemed to be disconnected topics eventually coalesced in the mid-to-late 1990s around a number of interconnected concerns and issues that now comprise PiE. Major objectives are to provide a new perspective to the topic, to facilitate more efficient and effective review of the literature by others, and to recognize the more significant, seminal contributions to the advancement of PiE as a field of research. Some of the most highly cited articles in all of environmental science now involve PiE. As of April 2015, a core group of 385 PiE articles had each received at least 200 citations; one had received 5424 citations. But hundreds of additional articles also played important roles in the evolution and advancement of the field.

Keywords: Pharmaceuticals; Environmental contaminants; History; Bibliometrics; Most cited

- Lina Abu Ghunmi, Grietje Zeeman, Manar Fayyad, Jules B. van Lier, Grey water treatment in a series anaerobic – Aerobic system for irrigation, Bioresource Technology, Volume 101, Issue 1, January 2010, Pages 41-50, ISSN 0960-8524, http://dx.doi.org/10.1016/j.biortech.2009.07.056.

(http://www.sciencedirect.com/science/article/pii/S0960852409009122)

Abstract: This study aims at treatment of grey water for irrigation, focusing on a treatment technology that is robust, simple to operate and with minimum energy consumption. The result is an optimized system consisting of an anaerobic unit operated in upflow mode, with a 1 day operational cycle, a constant effluent flow rate and varying liquid volume. Subsequent aerobic step is equipped with mechanical aeration and the system is insulated for sustaining winter conditions. The COD removal achieved by the anaerobic and aerobic units in summer and winter are 45%, 39% and 53%, 64%, respectively. Sludge in the anaerobic and aerobic reactor has a concentration of 168 and 8 mg VS L−1, respectively. Stability of sludge in the anaerobic and aerobic reactors is 80% and 93%, respectively, based on COD. Aerobic effluent quality, except for pathogens, agrees with the proposed irrigation water quality guidelines for reclaimed water in Jordan.

Keywords: Grey water; Aerobic; Anaerobic; Temperature; Irrigation

- Song Wen-jie, Fu Hong-yuan, Wang Gui-yao, Study on a Kind of Eco-concrete Retaining Wall's Block with Water Purification Function, Procedia Engineering, Volume 28, 2012, Pages 182-189, ISSN 1877-7058, http://dx.doi.org/10.1016/j.proeng.2012.01.703.

(http://www.sciencedirect.com/science/article/pii/S1877705812007138)

Abstract: Considering the environmental protection requirements for retaining wall and slope protection in Civil engineering and construction of water conservancy, a new type of retaining wall materials and structures with functions of slop reinforcement, slope greening and water purification was studied. In this paper, it designed a kind of Eco-concrete retaining wall's block which has functions of slope vegetation planting and water purification, and studied functions of water purification of this kind of Eco-concrete retaining wall's block through the water quality purification experiment. It shows that, the maximal disposable removal rates of CoDcr, TN and TP are respectively 87%, 70% and 90%, which means that functions of water purification of this kind of Eco-concrete retaining wall's block are very good.

Keywords: Eco-concrete; Retaining wall; Water purification ;

- Betty J.L. Laglbauer, Rita Melo Franco-Santos, Miguel Andreu-Cazenave, Lisa Brunelli, Maria Papadatou, Andreja Palatinus, Mateja Grego, Tim Deprez, Macrodebris and microplastics from beaches in Slovenia, Marine Pollution

Bulletin, Volume 89, Issues 1–2, 15 December 2014, Pages 356-366, ISSN 0025-326X, http://dx.doi.org/10.1016/j.marpolbul.2014.09.036.

(http://www.sciencedirect.com/science/article/pii/S0025326X14006456)

Abstract: Abstract

The amount of marine debris in the environment is increasing worldwide, which results in an array of negative effects to biota. This study provides the first account of macrodebris on the beach and microplastics in the sediment (shoreline and infralittoral) in relation to tourism activities in Slovenia. The study assessed the quality and quantity of macrodebris and the quality, size and quantity of microplastics at six beaches, contrasting those under the influences of tourism and those that were not. Beach cleanliness was estimated using the Clean Coast Index. Tourism did not seem to have an effect on macrodebris or microplastic quantity at beaches. Over 64% of macrodebris was plastic, and microplastics were ubiquitous, which calls for classification of plastics as hazardous materials. Standard measures for marine debris assessment are needed, especially in the form of an all-encompassing debris index. Recommendations for future assessments are provided for the Adriatic region.

Keywords: Marine debris; Plastic; Pollution; Tourism; Human-impact; Adriatic

- Grégorio Crini, Non-conventional low-cost adsorbents for dye removal: A review, Bioresource Technology, Volume 97, Issue 9, June 2006, Pages 1061-1085, ISSN 0960-8524, http://dx.doi.org/10.1016/j.biortech.2005.05.001.

(http://www.sciencedirect.com/science/article/pii/S0960852405002452)

Abstract: Adsorption techniques are widely used to remove certain classes of pollutants from waters, especially those that are not easily biodegradable. Dyes represent one of the problematic groups. Currently, a combination of biological treatment and adsorption on activated carbon is becoming more common for removal of dyes from wastewater. Although commercial activated carbon is a preferred sorbent for color removal, its widespread use is restricted due to high cost. As such, alternative non-conventional sorbents have been investigated. It is well-known that natural materials, waste materials from industry and agriculture and biosorbents can be obtained and employed as inexpensive sorbents. In this review, an extensive list of sorbent literature has been compiled. The review (i) presents a critical analysis of these materials; (ii) describes their characteristics, advantages and limitations; and (iii) discusses various mechanisms involved. It is evident from a literature survey of about 210 recent papers that low-cost sorbents have demonstrated outstanding removal capabilities for certain dyes. In particular, chitosan might be a promising adsorbent for environmental and purification purposes.

Keywords: Dyes; Adsorption; Low-cost adsorbents; Wastewater treatment

- Elke Aehle, Birgit Dräger, Tropane alkaloid analysis by chromatographic and electrophoretic techniques: An update, Journal of Chromatography B, Volume 878, Issues 17–18, 15 May 2010, Pages 1391-1406, ISSN 1570-0232, http://dx.doi.org/10.1016/j.jchromb.2010.03.007.

(http://www.sciencedirect.com/science/article/pii/S1570023210001418)

Abstract: Tropane alkaloids like atropine are antidotes applied against organophosphorus intoxications. Atropine is toxic itself and should be closely monitored during treatment. Hence, simple, fast, and sensitive determination methods for tropane alkaloids in serum are desirable. Mostly adopted methods of analysis are gas chromatography (GC); high performance liquid chromatography (HPLC), and capillary electrophoresis (CE). Various liquid and solid capillary fillings used in micellar electrokinetic chromatography, microemulsion electrokinetic chromatography, capillary electrochromatography, and enantioseparation provide high versatility to CE applications. In HPLC, specialised columns enhance separation efficacy. Ultraviolet light detection is common practise, but recently sensitivity and analyte identification were enhanced by coupling

GC, HPLC, and CE to mass spectrometry. Apart from medical treatment, tropane alkaloids, cocaine in particular, are abused with various intentions. Forensic analysis of tropane alkaloids and their metabolites comprises the additional difficulty of unequivocal drug identification. Because of severe legal consequences, sophisticated analytical methods were developed and may provide additional techniques for therapeutic drug monitoring. Examples from forensic cocaine analysis and from doping analysis are included in this review.

Keywords: Tropane alkaloids; Gas chromatography; High performance liquid chromatography; Capillary electrophoresis; Mass spectrometry; Intoxication

- Jia-Hong Kuo, Hui-Hsin Tseng, P. Srinivasa Rao, Ming-Yen Wey, The prospect and development of incinerators for municipal solid waste treatment and characteristics of their pollutants in Taiwan, Applied Thermal Engineering, Volume 28, Issues 17–18, December 2008, Pages 2305-2314, ISSN 1359-4311, http://dx.doi.org/10.1016/j.applthermaleng.2008.01.010.

(http://www.sciencedirect.com/science/article/pii/S135943110800032X)

Abstract: Taiwan is a small, densely populated island with unique experiences in the construction and operation of incinerators. In such a small area, Taiwan has built 22 incinerators over a short span of time, combusting large amount of municipal solid waste as much as 23,250 tons per day. This study focuses on the history of construction and development of incinerators in Taiwan as well as the characteristics of pollutants, such as heavy metals (Pb, Cd, and Hg), acid gases (NOx, SOx, CO, and HCl), and dioxins emitted from the incinerators. Furthermore, the study also covers the generation and composition of municipal solid waste (MSW), and the production of energy in Taiwan. According to Taiwan's data on pollutant emissions, the emission level of pollutants is under control and meets the stringent regulations of Taiwan Environmental Protection Administration (TEPA). Researches have shown that using air pollution control devices (APCDs) in the operation of incinerators provides effective measures for air pollutant control in Taiwan. The main advantage of using incinerators is the generation of electricity (waste-to-energy) during the incineration of municipal solid waste, producing energy that can be consumed by the general public and the industry. Taiwan's extensive experience in incinerator construction and operation may serve as an example for developing countries in devising waste treatment technology, energy recovery, and the control of contagious viral diseases.

Keywords: Incinerators; Pollutants control; Energy recovery

- Amandeep Kaur, Ahmad Umar, Sushil K. Kansal, Heterogeneous photocatalytic studies of analgesic and non-steroidal anti-inflammatory drugs, Applied Catalysis A: General, Volume 510, 25 January 2016, Pages 134-155, ISSN 0926-860X, http://dx.doi.org/10.1016/j.apcata.2015.11.008.

(http://www.sciencedirect.com/science/article/pii/S0926860X15302362)

Abstract: Abstract

The presence of pharmaceutical compounds in natural water is considered as an environmental problem due to their regular input in aquatic system and hence their removal becomes a challenging task. The present study provides information about the occurrence of pharmaceutical contaminants in water and their treatment. The advancement of distinct treatment processes for the removal of active pharmaceutical ingredients in wastewater has been described. The main objective of this study is to summarize the latest studies of the degradation of analgesic and anti-inflammatory drugs by heterogeneous photocatalysis. This study also highlights the effect of various operational parameters on degradation efficiency, kinetics and mineralization of various pharmaceutical compounds during the process.

Keywords: Analgesic; Anti-inflammatory drugs; Advanced oxidation processes; Photocatalysis; Titania

NEWSBRIEF, Applied Catalysis B: Environmental, Volume 57, Issue 3, 10 May 2005, Pages N1-N8, ISSN 0926-3373, http://dx.doi.org/10.1016/S0926-3373(05)00143-8.

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- Virendra Misra, S.D. Pandey, Hazardous waste, impact on health and environment for development of better waste management strategies in future in India, Environment International, Volume 31, Issue 3, April 2005, Pages 417-431, ISSN 0160-4120, http://dx.doi.org/10.1016/j.envint.2004.08.005.

(http://www.sciencedirect.com/science/article/pii/S0160412004001448)

Abstract: Industry has become an essential part of modern society, and waste production is an inevitable outcome of the developmental activities. A material becomes waste when it is discarded without expecting to be compensated for its inherent value. These wastes may pose a potential hazard to the human health or the environment (soil, air, water) when improperly treated, stored, transported or disposed off or managed. Currently in India even though hazardous wastes, emanations and effluents are regulated, solid wastes often are disposed off indiscriminately posing health and environmental risk. In view of this, management of hazardous wastes including their disposal in environment friendly and economically viable way is very important and therefore suggestions are made for developing better strategies. Out of the various categories of the wastes, solid waste contributes a major share towards environmental degradation. The present paper outlines the nature of the wastes, waste generating industries, waste characterization, health and environmental implications of wastes management practices, steps towards planning, design and development of models for effective hazardous waste management, treatment, approaches and regulations for disposal of hazardous waste. Appraisal of the whole situation with reference to Indian scenario is attempted so that a better cost-effective strategies for waste management be evolved in future.

Keywords: Hazardous waste; Treatment; Disposal; Management; Regulations; Waste minimization; Remediation

Chapter 11 - Relevant applications, In: Enrico Drioli, Alessandra Criscuoli and Efrem Curcio, Editor(s), Membrane Science and Technology, Elsevier, 2006, Volume 11, Pages 375-450, ISSN 0927-5193, ISBN 9780444522030, http://dx.doi.org/10.1016/S0927-5193(05)80012-9.

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- Yuzhong Li, Chunyuan Ma, Circular economy of a papermaking park in China: a case study, Journal of Cleaner Production, Volume 92, 1 April 2015, Pages 65-74, ISSN 0959-6526, http://dx.doi.org/10.1016/j.jclepro.2014.12.098.

(http://www.sciencedirect.com/science/article/pii/S0959652614014000)

Abstract: Abstract

Papermaking is regarded as an industry that consumes a great amount of energy and produces serious pollution. The papermaking industry in China, which has a large population and rapid economic development, is indispensable and presents a trend of rapid development. China and the rest of the world pay considerable attention to resource conservation and environmental protection. Therefore, determining how the papermaking industry can realize cleaner production and sustainable development is an urgent issue that should be addressed. This paper introduces Guangdong Silver Island Lake (GSIL) Papermaking Park, which realizes cleaner production and sustainable development by developing circular economy (CE). This park constructs a CE industrial mode by recycling energy, water, and materials. After 10 years of implementation, the CE

plan of GSIL Papermaking Park has integrated the resources of the papermaking and power industries horizontally, thus forming the unique development mode of its CE. The resource consumption, resource comprehensive utilization, and pollutant emission indexes of the park have reached the advanced level in the papermaking industry of China.

Keywords: Circular economy; Cleaner production; Industrial ecology; Eco-industrial; Papermaking industry; Coal fired power generation industry

- Naeemullah, Tasneem Gul Kazi, Hassan Imran Afridi, Faheem Shah, Sadaf Sadia Arain, Kapil Dev Brahman, Jamshed Ali, Mariam S. Arain, Simultaneous determination of silver and other heavy metals in aquatic environment receiving wastewater from industrial area, applying an enrichment method, Arabian Journal of Chemistry, Volume 9, Issue 1, January 2016, Pages 105-113, ISSN 1878-5352, http://dx.doi.org/10.1016/j.arabjc.2014.10.027.

(http://www.sciencedirect.com/science/article/pii/S1878535214002391)

Abstract: Abstract

In the present study, silver (Ag), cadmium (Cd), nickel (Ni), cobalt (Co) and lead (Pb) were simultaneously determined in water samples of fresh water canal receiving untreated effluents from an industrial area, of Sindh Pakistan. The analytes in the water sample were determined by CPE using ammonium pyrrolidinedithiocarbamate (APDC) as a complexing agent and then entrapped in non-ionic surfactant, octylphenoxypolyethoxyethanol (Triton X-114). The surfactant rich phase was diluted with acidic ethanol prior to analysis by flame atomic absorption spectrometry. The variables affecting the complexation and extraction steps such as pH of sample solution, concentration of oxine and Triton X-114, equilibration temperature and time period for shaking were investigated in detail. The validation of the procedure was carried out by analysis of a certified reference sample of water (CRM1634e). Reliability of the proposed method was also checked by the standard addition method in a real sample at three concentration levels of all metals. Under the optimum conditions, the preconcentration of 10 mL sample solutions, allowed preconcentration factor of 20-fold. The lower limit of detection obtained for Ag, Cd, Ni, Co and Pb was 0.42, 0.48, 0.92, 0.62, and 1.42 μg L−1, respectively. The proposed procedure was successfully applied to waste and fresh water samples for simultaneous determination of different metals. The concentration of Ag, Cd, Ni, Co and Pb has shown a decreased trend from 46.5–6.96, 23.0–8.92, 30.2–12.8, 14.2–4.45 and 15.3–5.32 μg L−1, respectively from initial entrance of waste water along the downstream of canal.

Keywords: Waste water; Cloud Point extraction; Heavy metal; Ammonium pyrrolidinedithiocarbamate; Flame atomic absorption spectrometry

- Sergio Morales-Torres, Luisa M. Pastrana-Martínez, José L. Figueiredo, Joaquim L. Faria, Adrián M.T. Silva, Graphene oxide-P25 photocatalysts for degradation of diphenhydramine pharmaceutical and methyl orange dye, Applied Surface Science, Volume 275, 15 June 2013, Pages 361-368, ISSN 0169-4332, http://dx.doi.org/10.1016/j.apsusc.2012.11.157.

(http://www.sciencedirect.com/science/article/pii/S0169433212021320)

Abstract: Graphene oxide (GO) and the benchmark TiO2 photocatalyst (P25) were used to prepare different composites (GOP), by a simple method of mixing and sonication, varying the GO content and the heat-treatment temperature under nitrogen. The composites were characterized by thermogravimetric (TG) and differential thermogravimetric (DTG) analyses, scanning electron microscopy (SEM), physical adsorption of nitrogen, UV–Vis and IR diffuse reflectance spectroscopies (DRUV and DRIFT), and point of zero charge (pHPZC) measurements. The morphology, microporosity and SBET of the composites did not vary significantly in comparison to P25, while an increase of their mesoporosity and mesopore diameter were observed due to the formation of GO aggregates coated with P25 nanoparticles. The aggregates were stabilized by the formation of TiOC bonds, which in turn produced a narrowing of the band gap relative to P25. The surface chemistry of GOP composites varied with the

GO content, being more acidic when higher GO content was used. The photocatalytic performance was evaluated for the degradation of diphenhydramine (DP) pharmaceutical and methyl orange (MO) dye under near-UV/Vis irradiation. The first order rate constant of MO photodegradation increased four times for some GOP composites with relation to P25 (i.e., from k = 52 × 10−3 to 207 × 10−3 min−1). Comparable efficiencies were observed when DP was used as model pollutant (i.e., around k = 54 × 10−3 min−1). The best performing photocatalyst was that containing 1.4 wt.% GO and treated at 200–300 °C. The improved performance was attributed to the reduction of GO during the thermal treatment and to the good contact between the TiO2 and the carbon phases.

Keywords: Graphene oxide; P25; TiO2 composite; Heterogeneous photocatalysis; Diphenhydramine; Methyl orange

- Zsófia Fodor, Jiří Jaromír Klemeš, Waste as alternative fuel – Minimising emissions and effluents by advanced design, Process Safety and Environmental Protection, Volume 90, Issue 3, May 2012, Pages 263-284, ISSN 0957-5820, http://dx.doi.org/10.1016/j.psep.2011.09.004.

(http://www.sciencedirect.com/science/article/pii/S0957582011000991)

Abstract: This paper reviews the utilisation of waste as an alternative fuel, commonly referred to as Waste-to-Energy (WTE). The paper contains a comprehensive survey of the literature published in this field with comparative analysis of different approaches and methods. The main features and properties of municipal and industrial waste have been analysed as these can vary significantly from location to location and year to year. The paper discusses the applicability and limitations of current and developing WTE technologies as well as new and emerging WTE technologies and the recent developments in design of for producing heat, power and fuels. Methodologies that are considered include criteria for technology selection, together with procedures that comply with the environmental EC regulations Best Available and Best Applicable Techniques (BREFs).

Keywords: Waste to energy; Minimising emissions and effluents; Environmental regulations; Advanced design

- Ali Akbar Asgharinezhad, Narges Mollazadeh, Homeira Ebrahimzadeh, Fatemeh Mirbabaei, Nafiseh Shekari, Magnetic nanoparticles based dispersive micro-solid-phase extraction as a novel technique for coextraction of acidic and basic drugs from biological fluids and waste water, Journal of Chromatography A, Volume 1338, 18 April 2014, Pages 1-8, ISSN 0021-9673, http://dx.doi.org/10.1016/j.chroma.2014.02.027.

(http://www.sciencedirect.com/science/article/pii/S002196731400257X)

Abstract: Abstract

The coextraction of acidic and basic drugs from different samples is a considerable and disputable concept in sample preparation strategies. In this study, for the first time, simultaneous extraction of acidic and basic drugs with magnetic nanoparticles based dispersive micro-solid phase extraction followed by high performance liquid chromatography-ultraviolet detection was introduced. Cetyltrimethyl ammonium bromide-coated Fe3O4@decanoic acid as an efficient sorbent was successfully applied to adsorb diclofenac (DIC) as an acidic and diphenhydramine (DPH) as a basic model compound. First, appropriate amount of synthetic Fe3O4@decanoic acid nanoparticles was added to aqueous solution of drugs. After adjusting the pH of the solution, cetyltrimethyl ammonium bromide (CTAB) was added to the mixture being stirred at a constant rate. After the adsorption of drugs and decantation of supernatant with a magnetic field, the sorbent was eluted with methanol by fierce vortex. The parameters affecting the extraction efficiency were optimized and obtained as: pH of the sample = 9, concentration of CTAB = 0.2 mmol L−1, amount of sorbent = 10 mg, extraction time = 5 min, no salt addition to sample, type and volume of the eluent = 50 µL methanol, and desorption time = 1 min. Under the optimum conditions detection limits and linear dynamic ranges were achieved in the range of 1.8–3.0, 5–1500 µg L−1 for DPH and 1.5–3.5, 5–1500 µg L−1 for DIC, respectively. The percent of extraction recovery and relative standard deviations (n = 5) were in the range of 47.3 – 60, 5.2 – 9.0 for DPH and 64 – 76.7, 5.1 – 5.8 for DIC, respectively. Ultimately, the applicability of the method was successfully confirmed

by the extraction and determination of DIC and DPH in human urine, plasma and waste water samples in the range of microgram per liter and satisfactory results were obtained.

Keywords: Dispersive micro-solid phase extraction; Coextraction; Cetyltrimethyl ammonium bromide-coated Fe3O4@decanoic acid; Diclofenac; Diphenhydramine

- Hanna-Leena Pesonen, Ewa Josko, Sari Hämäläinen, Improving eco-efficiency of a swimming hall through customer involvement, Journal of Cleaner Production, Volume 39, January 2013, Pages 294-302, ISSN 0959-6526, http://dx.doi.org/10.1016/j.jclepro.2012.07.042.

(http://www.sciencedirect.com/science/article/pii/S0959652612003800)

Abstract: Findings from a project aiming to improve eco-efficiency of a swimming hall in Finland are presented in this article. There are various opportunities for eco-efficiency improvements for a swimming hall, many of which belong to responsibilities of the staff. However, there are aspects where also customers could participate. Consequently, changes in the current behavior of the swimming hall management, staff and customers are required. Results from customer survey and staff interviews suggest that lack of knowledge about the swimming hall-specific environmental impacts and possibilities of the respondent (either staff or customers) to actively engage in pro-environmental work at the site are the greatest obstacles towards pro-environmental behavior. In this article, several options for how to promote pro-environmental behavior at a swimming hall are discussed.

Keywords: Environmental information; Environmental marketing; Pro-environmental behavior; Swimming hall; Value-action gap

- Shams Tabrez, Masood Ahmad, Effect of wastewater intake on antioxidant and marker enzymes of tissue damage in rat tissues: Implications for the use of biochemical markers, Food and Chemical Toxicology, Volume 47, Issue 10, October 2009, Pages 2465-2478, ISSN 0278-6915, http://dx.doi.org/10.1016/j.fct.2009.07.004.

(http://www.sciencedirect.com/science/article/pii/S0278691509003317)

Abstract: In the present study, alteration in antioxidant enzymes superoxide dismutase (SOD), catalase (CAT), glutathione reductase (GR), glutathione-S-transferase (GST) and glutathione peroxidase (GPx) and marker enzymes of tissue damage alanine transaminase (ALT), aspartate transaminase (AST) and alkaline phosphatase (ALP) with laboratory exposure to wastewaters from Aligarh (AWW) and Saharanpur (SWW) were investigated in rat liver and kidney. Levels of malondialdehyde (MDA), reduced glutathione (GSH) and hydrogen peroxide (H2O2) were also determined.

A profound enhancement of 5 and 2.5-folds in MDA level was recorded in the liver and kidney respectively as a result of oral administration of SWW to the rats. Exposure to both AWW and SWW resulted in 3–4-fold increase in GR activity and 3-fold increase in SOD and ALT activity in the hepatic tissue compared to control values. Ingestion of AWW and SWW resulted in 3.5-fold rise in renal AST levels whereas AWW caused 75% decline in GST activity in kidney of treated rats.

Results indicate that wastewater (AWW/SWW) caused severe damage to renal and hepatic tissues and the effect seems in part to be mediated by suppression of antioxidant system with GR and SOD as potential candidates for hepatic toxicity biomarkers of wastewaters.

Keywords: Antioxidant enzymes; Marker enzymes; Biomarkers; Wastewater; Water pollution; Rats

- Koen Binnemans, Peter Tom Jones, Bart Blanpain, Tom Van Gerven, Yiannis Pontikes, Towards zero-waste valorisation of rare-earth-containing industrial process residues: a critical review, Journal of Cleaner Production, Volume 99, 15 July 2015, Pages 17-38, ISSN 0959-6526, http://dx.doi.org/10.1016/j.jclepro.2015.02.089.

(http://www.sciencedirect.com/science/article/pii/S0959652615002164)

Abstract: Abstract

The supply risk for some critical rare-earth elements (REEs), which are instrumental in many cleantech applications, has sparked the development of innovative recycling schemes for End-of-Life fluorescent lamps, permanent magnets and nickel metal hydride batteries. These waste fractions represent relatively small volumes, albeit with relatively high rare-earth contents. Rare earths are also present in lower concentrations in a multitude of industrial process residues, such as phosphogypsum, bauxite residue (red mud), mine tailings, metallurgical slags, coal ash, incinerator ash and waste water streams. This review discusses the possibilities to recover rare earths from these “secondary resources”, which have in common that they contain only low concentrations of rare-earth elements, but are available in very large volumes and could provide significant amounts of rare earths. The success rate is set to increase if the rare-earth recovery from these industrial waste streams is part of a comprehensive, zero-waste, “product-centric” valorisation scheme, in which applications are found for the residual fractions that are obtained after removal of not only the rare earths but also other valuable (base) metals.

Keywords: Bauxite residue; Lanthanides; Phosphogypsum; Rare earths; Red mud; Mine tailings

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Contents of Volume 32, Environment International, Volume 32, Issue 8, December 2006, Pages 1130-1136, ISSN 0160-4120, http://dx.doi.org/10.1016/S0160-4120(06)00166-8.

(http://www.sciencedirect.com/science/article/pii/S0160412006001668)

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(http://www.sciencedirect.com/science/article/pii/S1010603012001748)

Abstract: The current eight published ISO standards associated with semiconductor photocatalysis are considered. These standards cover: (1) air purification (specifically, the removal of NO, acetaldehyde and toluene), (2) water purification (the photobleaching of methylene blue and oxidation of DMSO) (3) self-cleaning surfaces (the removal of oleic acid and subsequent change in water droplet contact angle), (4) photosterilisation (specifically probing the antibacterial action of semiconductor photocatalyst films) and (5) UV light sources for semiconductor photocatalytic ISO work. For each standard, the background is first considered, followed by a brief discussion of the standard particulars and concluding in a discussion of the pros and cons of the standard, with often recommendations for their improvement. Other possible standards for the future which would either compliment or enhance the current ones are discussed briefly.

Keywords: Photocatalysis; ISO; Standards; Titania; UV

- Zeinab F. Akl, Shymaa M. El-Saeed, Ayman M. Atta, In-situ synthesis of magnetite acrylamide amino-amidoxime nanocomposite adsorbent for highly efficient sorption of U(VI) ions, Journal of Industrial and Engineering Chemistry, Volume 34, 25 February 2016, Pages 105-116, ISSN 1226-086X, http://dx.doi.org/10.1016/j.jiec.2015.10.042.

(http://www.sciencedirect.com/science/article/pii/S1226086X15005079)

Abstract: Abstract

A new in-situ magnetite nanoparticles inserted into crosslinked poly (acrylamido-amineamidoxime-co-2-acrylamido-2-methylpropane sulfonic acid (AO/AMPS) were prepared and used as novel uranium adsorbents. The prepared composites were applied as adsorbents to remove U(VI) from aqueous solutions that could be separated by a simple magnetic separation method. The removal of U(VI) was evaluated by spectrophotometric method using arsenazo-III as complexing agent. The results showed that, the sorption process strongly depended on pH and the sorption equilibrium can be reached within 150 min. The Langmuir sorption isotherm model correlated well with the uranium sorption equilibrium data for the concentration range of 50–500 mg/L.

Keywords: Amidoxime; Uranyl; Recovery; Magnetite; Nanoparticles

- Marianne Stuart, Dan Lapworth, Emily Crane, Alwyn Hart, Review of risk from potential emerging contaminants in UK groundwater, Science of The Total Environment, Volume 416, 1 February 2012, Pages 1-21, ISSN 0048-9697, http://dx.doi.org/10.1016/j.scitotenv.2011.11.072.

(http://www.sciencedirect.com/science/article/pii/S0048969711013908)

Abstract: This paper provides a review of the types of emerging organic groundwater contaminants (EGCs) which are beginning to be found in the UK. EGCs are compounds being found in groundwater that were previously not detectable or known to be significant and can come from agricultural, urban and rural point sources. EGCs include nanomaterials, pesticides, pharmaceuticals, industrial compounds, personal care products, fragrances, water treatment by-products, flame retardants and surfactants, as well as caffeine and nicotine. Many are relatively small polar molecules which may not be effectively removed by drinking water treatment. Data from the UK Environment Agency's groundwater screening programme for organic pollutants found within the 30 most frequently detected compounds a number of EGCs such as pesticide metabolites, caffeine and DEET. Specific determinands frequently detected include pesticides metabolites, pharmaceuticals including carbamazepine and triclosan, nicotine, food additives and alkyl phosphates. This paper discusses the routes by which these compounds enter groundwater, their toxicity and potential risks to drinking water and the environment. It identifies challenges that need to be met to minimise risk to drinking water and ecosystems.

Keywords: Emerging contaminants; Groundwater; Toxicity; Risk assessment; Pesticides; Pharmaceuticals

- S.M. Abdel Azeem, S.M. Mohamed Attaf, M.F. El-Shahat, Acetylacetone phenylhydrazone functionalized polyurethane foam: Determination of copper, zinc and manganese in environmental samples and pharmaceutics using flame atomic absorption spectrometry, Reactive and Functional Polymers, Volume 73, Issue 1, January 2013, Pages 182-191, ISSN 1381-5148, http://dx.doi.org/10.1016/j.reactfunctpolym.2012.10.007.

(http://www.sciencedirect.com/science/article/pii/S1381514812002702)

Abstract: In the present work, acetylacetone phenylhydrazone (AAPH) was chemically anchored to polyurethane foam (PUF) via azo coupling of the toluidine NH2 in PUF to active CH2 in acetylacetone (AA) and further reaction to phenylhydrazine to give new solid phase extraction (SPE) sorbent for determination of Cu(II), Zn(II) and Mn(II) in natural and pharmaceutical samples. The AAPH–PUF was characterized by UV–VIS, IR, H1 NMR, elemental and TGA analysis. Optimal experimental

conditions were at pH 5–6, shaking time 20 min, sample flow rate 1.0 mL min−1, and desorption by 10 mL from 0.5 mol L−1 hydrochloric acid. The limit of detection (3σ) was found to be 0.10, 0.12 and 0.19 μg L−1 for Cu(II), Zn(II) and Mn(II), respectively. A preconcentration factor of 100 has been achieved for all elements. Precision (RSD%) was found to be 6.3%, 5.3% and 3.2% (n = 5), respectively. Successful application was achieved for environmental samples (tap water, olive leaves, and fish liver) and pharmaceutical formulation. The obtained recovery varied between 90.8% and 96.8% and RSD was under 6.7%.

Keywords: Acetylacetone hydrazone; Polyurethane foam; Solid-phase extraction; Metal ions; Environmental samples

- Mustafa Tuzen, Mustafa Soylak, Multiwalled carbon nanotubes for speciation of chromium in environmental samples, Journal of Hazardous Materials, Volume 147, Issues 1–2, 17 August 2007, Pages 219-225, ISSN 0304-3894, http://dx.doi.org/10.1016/j.jhazmat.2006.12.069.

(http://www.sciencedirect.com/science/article/pii/S0304389407000131)

Abstract: A solid phase extraction procedure has been established for chromium speciation in natural water samples. The procedure is based on the solid phase extraction of the Cr(VI)-ammonium pyrrolidine dithiocarbamate (APDC) chelate on multiwalled carbon nanotubes (MWNTs). After oxidation of Cr(III) to Cr(VI) by using hydrogen peroxide, the presented method was applied to the determination of the total chromium. The level of Cr(III) is calculated by difference of total chromium and Cr(VI) levels. The procedure was optimized for some analytical parameters including pH, eluent type, flow rates of sample and eluent, matrix effects, etc. The detection limit based on 3σ criterion was 0.90 μg L−1 for Cr(VI). The adsorption capacity of multiwalled carbon nanotubes was 9.50 mg g−1 Cr (VI). The presented method was applied for the speciation of chromium in natural water sample with satisfactory results (recoveries > 95%, R.S.D.'s < 9%).

Keywords: Multiwalled carbon nanotubes; Speciation; Chromium; Solid phase extraction; Atomic absorption spectrometry

- E.O. Scott-Emuakpor, A. Kruth, M.J. Todd, A. Raab, G.I. Paton, D.E. Macphee, Remediation of 2,4-dichlorophenol contaminated water by visible light-enhanced WO3 photoelectrocatalysis, Applied Catalysis B: Environmental, Volumes 123–124, 23 July 2012, Pages 433-439, ISSN 0926-3373, http://dx.doi.org/10.1016/j.apcatb.2012.05.010.

(http://www.sciencedirect.com/science/article/pii/S0926337312002068)

Abstract: The application of semiconductor photocatalysis in waste water treatment has been intensively investigated over the past decade. Most studies involve titanium-based photocatalysts; however, practical applications are still limited by their poor visible light activity. As an alternative, a tungsten trioxide-based photoelectrocatalytic fuel cell (PECFC) with a cell configuration based on the proton exchange membrane fuel cell (PEMFC) technology has been employed for pollutant remediation. In this study, the degradation of a persistent chlorophenol (2,4-dichlorophenol) was assessed using a visible light active tungsten trioxide photocatalyst. The degradative progress of the 2,4-DCP was monitored over a period of 24 h by both chemical analysis and a bacterial biosensor (Escherichia coli HB101 pUCD607) toxicity assay. A 74% decrease in concentration of the 2,4-DCP was observed after a period of 24 h, from which ca. 54% were accountable to degradation processes and 20% due to pollutant losses by adsorption or volatilisation. The biosensor toxicity response correlated well with the observed concentration reduction of 2,4-DCP, but also indicated the formation of more toxic intermediates. HPLC–MS analysis was carried out to study intermediate degradation products. There were indications of the occurrence of stable dimers within the first few hours of the degradation process and the formation of intermediate degradation products of higher bacterial toxicity than the parent compound. Although the potential of the PECFC, as a sustainable method for water treatment, has been demonstrated, further work is required to optimise this new technology for mineralisation of organic contaminants.

Keywords: Tungsten trioxide; 2,4-Dichlorophenol; Photoelectrocatalysis; Waste water; Bacterial biosensor

- Robert Loos, Giovanni Locoro, Sara Comero, Serafino Contini, David Schwesig, Friedrich Werres, Peter Balsaa, Oliver Gans, Stefan Weiss, Ludek Blaha, Monica Bolchi, Bernd Manfred Gawlik, Pan-European survey on the occurrence of selected polar organic persistent pollutants in ground water, Water Research, Volume 44, Issue 14, July 2010, Pages 4115-4126, ISSN 0043-1354, http://dx.doi.org/10.1016/j.watres.2010.05.032.

(http://www.sciencedirect.com/science/article/pii/S0043135410003404)

Abstract: This study provides the first pan-European reconnaissance of the occurrence of polar organic persistent pollutants in European ground water. In total, 164 individual ground-water samples from 23 European Countries were collected and analysed (among others) for 59 selected organic compounds, comprising pharmaceuticals, antibiotics, pesticides (and their transformation products), perfluorinated acids (PFAs), benzotriazoles, hormones, alkylphenolics (endocrine disrupters), Caffeine, Diethyltoluamide (DEET), and Triclosan. The most relevant compounds in terms of frequency of detection and maximum concentrations detected were DEET (84%; 454 ng/L), Caffeine (83%; 189 ng/L), PFOA (66%; 39 ng/L), Atrazine (56%; 253 ng/L), Desethylatrazine (55%; 487 ng/L), 1H-Benzotriazole (53%; 1032 ng/L), Methylbenzotriazole (52%; 516 ng/L), Desethylterbutylazine (49%; 266 ng/L), PFOS (48%, 135 ng/L), Simazine (43%; 127 ng/L), Carbamazepine (42%; 390 ng/L), nonylphenoxy acetic acid (NPE1C) (42%; 11 µg/L), Bisphenol A (40%; 2.3 µg/L), PFHxS (35%; 19 ng/L), Terbutylazine (34%; 716 ng/L), Bentazone (32%; 11 µg/L), Propazine (32%; 25 ng/L), PFHpA (30%; 21 ng/L), 2,4-Dinitrophenol (29%; 122 ng/L), Diuron (29%; 279 ng/L), and Sulfamethoxazole (24%; 38 ng/L). The chemicals which were detected most frequently above the European ground water quality standard for pesticides of 0.1 µg/L were Chloridazon-desphenyl (26 samples), NPE1C (20), Bisphenol A (12), Benzotriazole (8), N,N′-Dimethylsulfamid (DMS) (8), Desethylatrazine (6), Nonylphenol (6), Chloridazon-methyldesphenyl (6), Methylbenzotriazole (5), Carbamazepine (4), and Bentazone (4). However, only 1.7% of all single analytical measurements (in total ˜ 8000) were above this threshold value of 0.1 µg/L; 7.3% were > than 10 ng/L.

Keywords: Ground water; Pan-European monitoring; Non-probabilistic sampling; Polar organic contaminants; SPE-LC-MS2

- Carolina Fernández-Ramos, Dalibor Šatínský, Barbora Šmídová, Petr Solich, Analysis of trace organic compounds in environmental, food and biological matrices using large-volume sample injection in column-switching liquid chromatography, TrAC Trends in Analytical Chemistry, Volume 62, November 2014, Pages 69-85, ISSN 0165-9936, http://dx.doi.org/10.1016/j.trac.2014.07.008.

(http://www.sciencedirect.com/science/article/pii/S0165993614001654)

Abstract: Abstract

In recent years, the emergence and the fate of organic compounds in environmental, food and biological samples have resulted in increased public concern because these compounds have the capacity to produce adverse health effects and have a negative influence on human life. This article presents an overview of the applicability of large-volume sample injection (LVSI) in column-switching high-performance liquid chromatography (HPLC) systems for the trace analysis of organic compounds (i.e., pesticides, herbicides, fungicides, pharmaceuticals, illegal food additives, toxins, and other organic contaminants) in different matrices (i.e., environmental, food and biological) as an alternative approach to preconcentrating and lowering the limits of detection of chromatographic methods. This review examines the general and practical aspects, the advantages, the pitfalls and the troubleshooting of method development, and future perspectives and trends of LVSI in on-line solid-phase extraction with HPLC for preconcentration and analysis of trace organic compounds.

Keywords: Biological sample; Column-switching chromatography; Contaminant; Environmental sample; Food sample; High-performance liquid chromatography; Large-volume sample injection; On-line solid-phase extraction; Solid-phase extraction; Trace analysis

Author index for Volume 32, Environment International, Volume 32, Issue 8, December 2006, Pages 1106-1112, ISSN 0160-4120, http://dx.doi.org/10.1016/S0160-4120(06)00164-4.

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- Irina Levchuk, Amit Bhatnagar, Mika Sillanpää, Overview of technologies for removal of methyl tert-butyl ether (MTBE) from water, Science of The Total Environment, Volumes 476–477, 1 April 2014, Pages 415-433, ISSN 0048-9697, http://dx.doi.org/10.1016/j.scitotenv.2014.01.037.

(http://www.sciencedirect.com/science/article/pii/S0048969714000461)

Abstract: Abstract

Wide use of methyl tert-butyl ether (MTBE) as fuel oxygenates leads to worldwide environment contamination with this compound basically due to fuel leaks from storage or pipelines. Presence of MTBE in drinking water is of high environmental and social concern. Existing methods for MTBE removal from water have a number of limitations which can be possibly overcome in the future with use of emerging technologies. This work aims to provide an updated overview of recent developments in technologies for MTBE removal from water.

Keywords: Water treatment; Methyl tert-butyl ether removal; MTBE; Review

- Shane A. Snyder, Samer Adham, Adam M. Redding, Fred S. Cannon, James DeCarolis, Joan Oppenheimer, Eric C. Wert, Yeomin Yoon, Role of membranes and activated carbon in the removal of endocrine disruptors and pharmaceuticals, Desalination, Volume 202, Issues 1–3, 5 January 2007, Pages 156-181, ISSN 0011-9164, http://dx.doi.org/10.1016/j.desal.2005.12.052.

(http://www.sciencedirect.com/science/article/pii/S0011916406012094)

Abstract: Endocrine disrupting chemicals and pharmaceuticals represent two classes of emerging contaminants that are ubiquitously present in municipal wastewater effluents. Some of these contaminants have been shown to impact aquatic organisms at trace concentrations (i.e., ng/L). Moreover, the public has expressed human health concerns regarding the presence of emerging contaminants in water reuse projects. The primary objective of this investigation was to determine the efficacy of various membranes and activated carbons for the removal of endocrine disruptors, pharmaceuticals, and personal care products. A suite of structurally diverse target compounds was selected for evaluation based largely upon occurrence and molecular structure. Several membrane types and applications were evaluated at pilot- and/or full-scale, including: microfiltration, ultrafiltration, nanofiltration, reverse osmosis, electrodialysis reversal, membrane bioreactors, and combinations of membranes in series. Granular activated carbon was evaluated at bench-scale using rapid small scale column tests and at two full-scale utilities. Microfiltration and ultrafiltration were found to reject very few target compounds; however, some loss of steroidal type compounds was observed. Nanofiltration and reverse osmosis were capable of significant rejection of nearly all target compounds, though compounds were detectable at trace levels in permeates. Granular activated carbon was highly effective at removing all target chemicals. However, break-through curves clearly demonstrated that compounds with greater hydrophilicity breach activated carbon faster than hydrophobic compounds. In full-scale applications,

the impact of regeneration was observed as activated carbon filters that received regular regeneration had minimal breakthrough of organic contaminants, while non-regenerated filters displayed no removal of target compounds. Findings confirm that membrane and carbon processes are capable of greatly reducing the concentrations of emerging contaminants; however, several compounds are detectable in membrane permeate and carbon effluent.

Keywords: Endocrine disruptor; Pharmaceutical; Treatment; Membrane; Reuse; GAC; Activated carbon; Reverse osmosis; Emerging contaminant

- Mervat F. Zayed, Wael H. Eisa, Phoenix dactylifera L. leaf extract phytosynthesized gold nanoparticles; controlled synthesis and catalytic activity, Spectrochimica Acta Part A: Molecular and Biomolecular Spectroscopy, Volume 121, 5 March 2014, Pages 238-244, ISSN 1386-1425, http://dx.doi.org/10.1016/j.saa.2013.10.092.

(http://www.sciencedirect.com/science/article/pii/S1386142513012493)

Abstract: Abstract

A green synthesis route was reported to explore the reducing and capping potential of Phoenix dactylifera extract for the synthesis of gold nanoparticles. The processes of nucleation and growth of gold nanoparticles were followed by monitoring the absorption spectra during the reaction. The size and morphology of these nanoparticles was typically imaged using transmission electron microscopy (TEM). The particle size ranged between 32 and 45 nm and are spherical in shape. Fourier transform infrared (FTIR) analysis suggests that the synthesized gold nanoparticles might be stabilized through the interactions of hydroxyl and carbonyl groups in the carbohydrates, flavonoids, tannins and phenolic acids present in P. dactylifera. The as-synthesized Au colloids exhibited good catalytic activity for the degradation of 4-nitrophenol.

Keywords: Green synthesis; Gold nanoparticles; Phoenix dactylifera; 4-Nitrophenol

- M. Qamar, M.A. Gondal, Z.H. Yamani, Synthesis of highly active nanocrystalline WO3 and its application in laser-induced photocatalytic removal of a dye from water, Catalysis Communications, Volume 10, Issue 15, 15 September 2009, Pages 1980-1984, ISSN 1566-7367, http://dx.doi.org/10.1016/j.catcom.2009.07.014.

(http://www.sciencedirect.com/science/article/pii/S1566736709002799)

Abstract: Tungsten oxide nanoparticles were synthesized using the sol–gel process and applied for heterogeneous photocatalytic removal of a dye using a 355 nm laser radiation generated from Nd:YAG for the first time. Effect of various parameters, such as calcination temperature, calcination time, catalyst concentration and laser energy on the photocatalytic removal of dye has been investigated. The study showed that almost complete degradation of dye can be achieved within very short time of reaction (within few minutes) in presence of nanocrystalline WO3 under laser irradiation. The removal process obeys first-order kinetics with an appreciable rate constant 0.146 min−1. The main reason of high efficiency is the nanostructure nature of WO3 and the laser as an excitation source as compared with the conventional setups using lamps and conventional microstructure catalysts.

Keywords: Laser-induced photocatalysis; Nanocrystalline tungsten oxide; Sol–gel synthesis; Dye degradation

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- Nickie Butt, The impact of cruise ship generated waste on home ports and ports of call: A study of Southampton, Marine Policy, Volume 31, Issue 5, September 2007, Pages 591-598, ISSN 0308-597X, http://dx.doi.org/10.1016/j.marpol.2007.03.002.

(http://www.sciencedirect.com/science/article/pii/S0308597X07000218)

Abstract: Cruise ships represent less than 1% of the global merchant fleet yet it has been estimated that they are responsible for 25% of all waste generated by merchant vessels. This volume of waste produces pressures on the environment, particularly with respect to ship-generated waste disposal at home ports and ports of call. Southampton, home port for both Cunard and P&O, and a port of call for Royal Caribbean Cruises, is the focus of this study. This paper investigates current waste management and disposal options for cruise ship generated waste and the associated impacts of this waste for ports. It is concluded that all cruise vessels should vigorously pursue a waste reduction strategy and for ports to provide adequate recycling, reduction and re-use facilities for cruise ship generated waste, optimising use of local facilities whenever possible.

Keywords: Waste; Cruise ships; Ports of call; Home port

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(http://www.sciencedirect.com/science/article/pii/S0016703709002646)

- Tait Chirenje, Claude Epstein, Raymond Mueller, Chapter 26 Water quality issues in the outer coastal plains: New Jersey, In: Dibyendu Sarkar, Rupali Datta and Robyn Hannigan, Editor(s), Developments in Environmental Science, Elsevier, 2007, Volume 5, Pages 561-589, ISSN 1474-8177, ISBN 9780080465227, http://dx.doi.org/10.1016/S1474-8177(07)05026-7.

(http://www.sciencedirect.com/science/article/pii/S1474817707050267)

Abstract: New Jersey is the most densely populated state in the US and yet it is home to one of the most pristine groundwater resources in the country, the Kirkwood–Cohansey Aquifer System. This chapter discusses some of the activities that affect water quality in New Jersey's coastal plains. The most significant activities are human induced and they include excessive groundwater withdrawal and the addition of non-point and point source contaminants. The effects of those human activities that alter surface soils in ways that promote the movement of chemicals to streams and groundwater is included. The chemicals addressed include point source contaminants coming from superfund sites, landfills, underground storage tanks (USTs), sewage facilities, stormwater runoff facilities, storage lagoons, and other “state permitted” discharges. The contaminants include nitrates (NO3−), phosphates, pesticides, some chlorides and trace metals, and many volatile organic compounds (VOCs). Some of these come directly from their natural or human-induced deposition on the surface or come about because of the secondary impact of these deposited chemicals on surface soils and sediments. Well water withdrawals have also altered the pre-development groundwater and surface water flow patterns. Chlorides from brackish bays and tidal rivers and from the ocean itself have recharged coastal plain aquifers in Raritan Bay, Delaware and along the Atlantic Ocean.

These pumping centers are also drawing chlorides and other ions from saline groundwater coming from deeper aquifers. In addition, VOCs and Fe have recharged underlying aquifers from contaminated rivers and point sources toward these pumping centers.

- Qiaobao Zhang, Kaili Zhang, Daguo Xu, Guangcheng Yang, Hui Huang, Fude Nie, Chenmin Liu, Shihe Yang, CuO nanostructures: Synthesis, characterization, growth mechanisms, fundamental properties, and applications, Progress in Materials Science, Volume 60, March 2014, Pages 208-337, ISSN 0079-6425, http://dx.doi.org/10.1016/j.pmatsci.2013.09.003.

(http://www.sciencedirect.com/science/article/pii/S0079642513000704)

Abstract: Abstract

Nanoscale metal oxide materials have been attracting much attention because of their unique size- and dimensionality-dependent physical and chemical properties as well as promising applications as key components in micro/nanoscale devices. Cupric oxide (CuO) nanostructures are of particular interest because of their interesting properties and promising applications in batteries, supercapacitors, solar cells, gas sensors, bio sensors, nanofluid, catalysis, photodetectors, energetic materials, field emissions, superhydrophobic surfaces, and removal of arsenic and organic pollutants from waste water. This article presents a comprehensive review of recent synthetic methods along with associated synthesis mechanisms, characterization, fundamental properties, and promising applications of CuO nanostructures. The review begins with a description of the most common synthetic strategies, characterization, and associated synthesis mechanisms of CuO nanostructures. Then, it introduces the fundamental properties of CuO nanostructures, and the potential of these nanostructures as building blocks for future micro/nanoscale devices is discussed. Recent developments in the applications of various CuO nanostructures are also reviewed. Finally, several perspectives in terms of future research on CuO nanostructures are highlighted.

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- M. Espinosa Bosch, A.J. Ruiz Sánchez, F. Sánchez Rojas, C. Bosch Ojeda, Analytical methodologies for the determination of cisplatin, Journal of Pharmaceutical and Biomedical Analysis, Volume 47, Issue 3, 15 July 2008, Pages 451-459, ISSN 0731-7085, http://dx.doi.org/10.1016/j.jpba.2008.01.047.

(http://www.sciencedirect.com/science/article/pii/S0731708508001003)

Abstract: cis-Diamminedichloroplatinum(II) (cisplatin) is a important chemotherapeutic drug for cancer treatment since 1978. Unfortunately, because of the severe side-effects like nephrotoxicity, ototoxicity, etc., they are administered in small doses at low concentration establishing the maximum limit dosage to 100 mg/m2 (21 days).

A variety of analytical methods have been proposed for the determination of cisplatin in biological fluids and tissues that permit the accurate determination at or below the part per billion level in the native sample. The purpose of the current review is to provide a systematic survey of the latest analytical techniques for the determination of cisplatin in biological samples.

Keywords: Cisplatin; Pharmaceutical analysis; Review; Analytical methodologies

- D.J. Roddy and C. Manson-Whitton, 5.10 - Biomass Gasification and Pyrolysis, In Comprehensive Renewable Energy, edited by Ali Sayigh,, Elsevier, Oxford, 2012, Pages 133-153, ISBN 9780080878737, http://dx.doi.org/10.1016/B978-0-08-087872-0.00514-X.

(http://www.sciencedirect.com/science/article/pii/B978008087872000514X)

Abstract: Abstract

An overview of the current state of gasification and pyrolysis technology development is presented in the form of a review of the main gasifier process designs alongside a series of case studies showing how the technologies have been deployed in practice. This is supported by an examination of problems and solutions for the engineered gasification and pyrolysis system, including not only the core conversion but also the feedstock specification, preparation and handling, and downstream gas processing. Particular emphasis is placed on the production of synthesis gas for synthetic fuels since the requirements are particularly onerous. A review of the historical context and some thoughts on likely future developments are also included.

Keywords: Biomass; Feedstocks; Gasification; Pyrolysis; Synthesis gas

- José Benito Quintana, Rosario Rodil, Soledad Muniategui-Lorenzo, Purificación López-Mahía, Darío Prada-Rodríguez, Multiresidue analysis of acidic and polar organic contaminants in water samples by stir-bar sorptive extraction–liquid desorption–gas chromatography–mass spectrometry, Journal of Chromatography A, Volume 1174, Issues 1–2, 7 December 2007, Pages 27-39, ISSN 0021-9673, http://dx.doi.org/10.1016/j.chroma.2007.07.088.

(http://www.sciencedirect.com/science/article/pii/S0021967307013283)

Abstract: The feasibility of stir-bar sorptive extraction (SBSE) followed by liquid desorption in combination with large volume injection (LVI)-in port silylation and gas chromatography–mass spectrometry (GC–MS) for the simultaneous determination of a broad range of 46 acidic and polar organic pollutants in water samples has been evaluated. The target analytes included phenols (nitrophenols, chlorophenols, bromophenols and alkylphenols), acidic herbicides (phenoxy acids and dicamba) and several pharmaceuticals. Experimental variables affecting derivatisation yield and peak shape as a function of different experimental PTV parameters [initial injection time, pressure and temperature and the ratio solvent volume/N-(tert-butyldimethylsilyl)-N-methyltrifluoroacetamide (MTBSTFA) volume] were first optimised by an experimental design approach. Subsequently, SBSE conditions, such as pH, ionic strength, agitation speed and extraction time were investigated. After optimisation, the method failed only for the extraction of most polar phenols and some pharmaceuticals, being suitable for the determination of 37 (out of 46) pollutants, with detection limits for these analytes ranging between 1 and 800 ng/L and being lower than 25 ng/L in most cases. Finally, the developed method was validated and applied to the determination of target analytes in various aqueous environmental matrices, including ground, river and wastewater. Acceptable accuracy (70–130%) and precision values (<20%) were obtained for most analytes independently of the matrix, with the exception of some alkylphenols, where an isotopically labelled internal standard would be required in order to correct for matrix effects. Among the drawbacks of the method, carryover was identified as the main problem even though the Twisters were cleaned repeatedly.

Keywords: Phenols; Pharmaceuticals; Herbicides; Water samples; Stir-bar sorptive extraction (SBSE); Derivatisation; Silylation; Programmed temperature vaporisation (PTV); Large volume injection (LVI); Gas chromatography–mass spectrometry (GC–MS)

- T.J. Bandosz, Chapter 5 Desulfurization on activated carbons, In: Teresa J. Bandosz, Editor(s), Interface Science and Technology, Elsevier, 2006, Volume 7, Pages 231-292, ISSN 1573-4285, ISBN 9780123705365, http://dx.doi.org/10.1016/S1573-4285(06)80014-1.

(http://www.sciencedirect.com/science/article/pii/S1573428506800141)

Abstract: Publisher Summary

This chapter provides a comprehensive summary of surface science involved in the application of activated carbon for air cleaning from sulfur containing species, such as hydrogen sulfide, sulfur dioxide, and mercaptans. The removal of organic sulfur-containing compounds from both gaseous and liquid fuel is addressed. The emphasis is placed on the role of activated carbon surfaces, either unmodified or modified in the processes of adsorption and catalytic oxidation of the pollutants. Activated carbons, because of their unique surface chemistry, act not only as adsorbents but also as catalysts for the oxidation of inorganic and organic species, and their surface can be modified and tailored toward desired applications. The removal of sulfur compounds is usually termed “desulfurization.” In desulfurization, sulfur-containing compounds have to be physically separated, chemical reaction is to be imposed upon them to improve separation, or they have to be decomposed before separation. For separation, physical adsorption, reactive adsorption on various sorbents (from the gas or liquid phase), extraction and precipitation are generally used. The major sources of air pollution are highly industrialized countries, such as the United States of America and European nations.