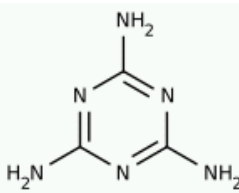
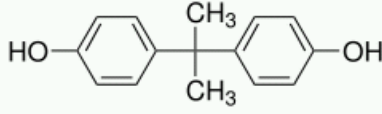
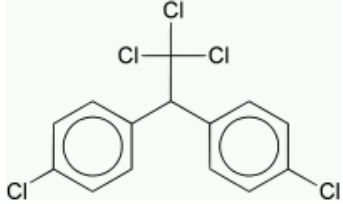


國立臺北大學自然資源與環境管理研究所

108 學年度第一學期『環境工程科學概論』

課程講義(06)：環境化學概要
Introduction to Environmental Chemistry

- REVIEW OF BASIC CHEMICAL CONCEPTS
 - “Chemistry is the study of matter”
 - Atoms, Elements, and the Periodic Table => Isotopes
 - Chemical Bond and Intermolecular Forces
 - Mole, Molar Units (Molarity), and Activity Units
 - Chemical Reactions and Stoichiometry
 - ⇒ Balancing Chemical Reactions
 - ⇒ Types of Chemical Reactions: Precipitation-Dissolution Reaction, Complexation Reaction, Oxidation-Reduction (Redox) Reactions
 - Chemical Equilibrium
 - ⇒ Precipitation (K_{sp}), Partial Pressure and Molar Rate (Molarity), and pH
 - Chemical Kinetics
 - Important Elements
 - ⇒ Carbon, Oxygen, Hydrogen, Nitrogen, Sulfur, and Phosphorus
 - ⇒ Halogen: Fluorine, Chlorine, Bromine
 - ⇒ Heavy Metals: Lead (Pb) 鉛、Arsenic (As) 砷、Cadmium (Cd) 鎘、Mercury (Hg) 汞、Chromium (Cr) 鉻、Other Metals (Atomic Weight > 40)
 - ⇒ RoHS Directive => Pb, Cd, Hg, Cr⁺⁶, 2 Flame Retardants (Polybrominated biphenyls, PBB; Polybrominated diphenyl ether, PBDE)
 - ⇒ Greenhouse Gases: CO₂, CH₄, N₂O, HFCs (Fluorohydrocarbons), PFCs (Perfluorocarbons), SF₆, NF₃
 - ⇒ Rare Earth Elements (REE) => Epitaxy (GIS); Silicon crystal => Wafer
 - Inorganic Chemicals and Organic Chemicals
 - ⇒ Organic Farming and Organic Food
 - ⇒ Genetically Modified Organism (GMO)
- ORGANIC CHEMISTRY
 - Alkane, Alkene, and Alkynes => 甲烷、乙烯、丙炔
 - Aryl (Aromatic) Compounds
 - ⇒ BTX (Benzene-Toluene-Xylene) and PAH (Polycyclic aromatic hydrocarbon)
 - ⇒ PCB: Polychlorinated biphenyl; PCDDs: Polychlorinated dibenzo-p-dioxins
 - ⇒ DDT: di-chloro-diphenyl-tri-chloro-ethane 二氯二苯基三氯乙烷
 - Phenol：壬基苯酚 (Nonyl Phenol, NP)；雙酚 A (Bisphenol A, BPA)
 - Cyanurotriamine (Melamine) 三聚氰胺
 - ⇒ Melamine resin 三聚氰胺-甲醛樹脂 (美耐皿)

 <p>三聚氰胺 (Melamine) Cyanurotriamine 化學式：$C_3H_6N_6$ 1,3,5-Triazine-2,4,6-triamine</p>	 <p>雙酚 A，Bisphenol A (BPA) 化學式：$(CH_3)_2C(C_6H_4OH)_2$ 4,4'-dihydroxy-2,2-diphenylpropane</p>	 <p>滴滴涕，雙對氯苯基三氯乙烷 化學式：$(ClC_6H_4)_2CH(CCl_3)$ Dichloro-Diphenyl-Trichloroethane</p>
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● WATER CHEMISTRY

- Physical Properties of Water
- State of Solution Impurities
⇒ Distillation, Precipitation, Adsorption, and Liquid Extraction ⇒ Suspensions
- Concentration Units in Aqueous Solutions or Suspensions
⇒ ppm vs. mg/L; Normality and Equivalent Weight
- Transport and Fate of Water Pollutants
- Water Purification Techniques ⇒ Necessary? ⇒ Risk of Emerging Technology
⇒ Physical Techniques: Filtration, UV, RO, etc.
⇒ Chemical Techniques: Ion Exchange, Distillation, O_3 , etc.
⇒ Nano-Techniques: Ultrafiltration, Bio-Film, etc.

● ATMOSPHERIC CHEMISTRY

- Compressible Fluids vs. Incompressible Fluids
- Composition of the Atmosphere
- Ideal Gas Law and Ideal Gas Constant ⇒ 22.4 L/mole, 24.5 L/mole
- Dalton's Law of Partial Pressures and Henry Constant
- Concentration of Pollutants in Air
⇒ Gaseous vs. Particulate Pollutants ⇒ ppm(v) vs. mg/m³
- Photochemical Reactions
- Radiative Forcing and Greenhouse Effect
⇒ Representative Concentration Pathway

● NUCLEAR CHEMISTRY

- $E = mc^2$
- Nuclear Fission vs. Nuclear Fusion
- Radiation and Radioactivity: Nuclear Decay and Half Life

● HOMEWORK ASSIGNMENT #3 (Due 2019/10/29) :

請定義何謂「毒性及關注化學物質」，一般俗稱的「環境賀爾蒙」(具有內分泌干擾素特性之化學物質)屬於那一類的「毒性化學物質」? 「環境賀爾蒙」又會對人體及生態系統造成甚麼危害呢?