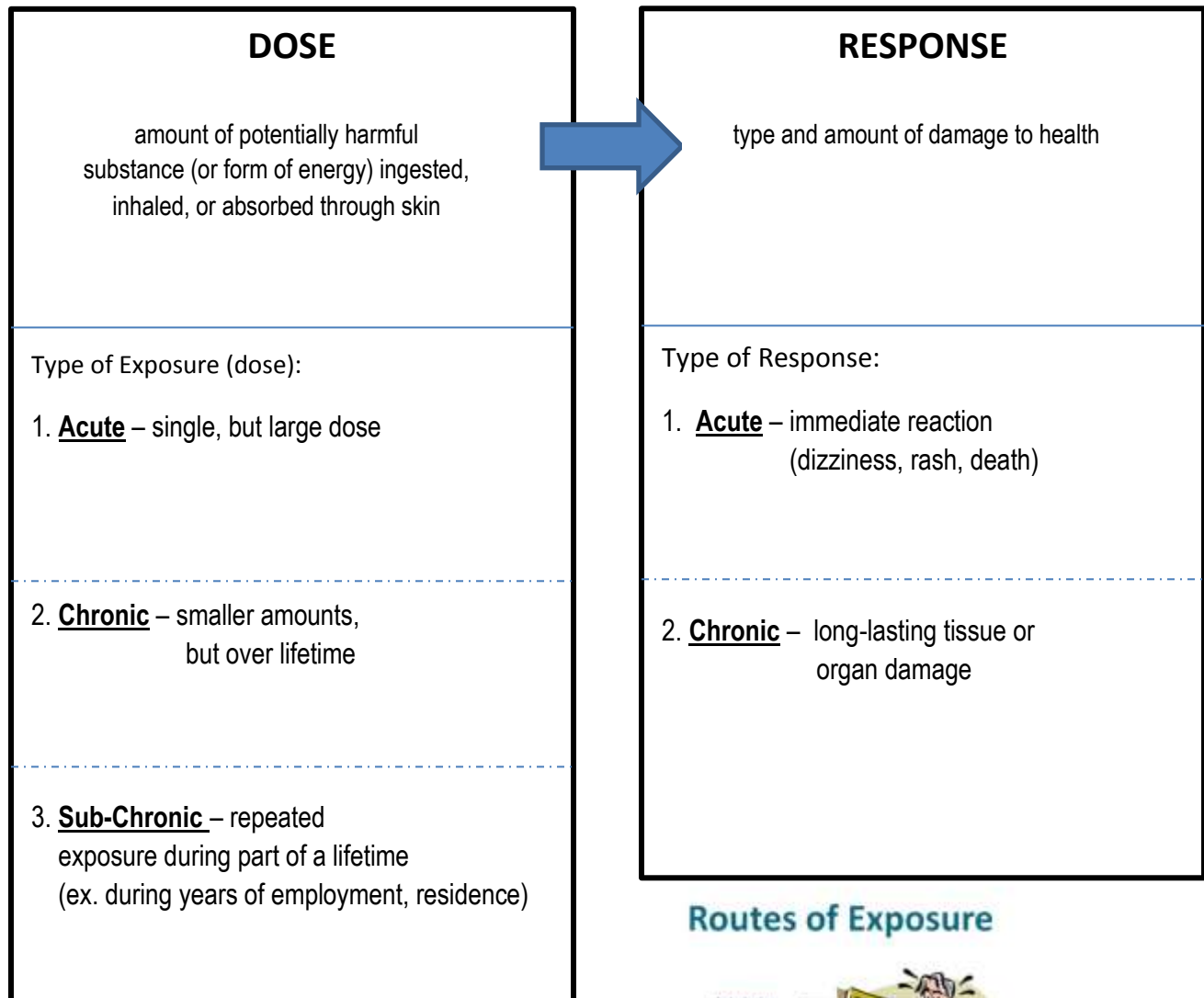


**AIM: What determines the harm a chemical can cause?**

Toxicology - the study of the adverse effects of chemicals on living organisms

Toxicity - how harmful a substance is



**Routes of Exposure**



## Chemical Interactions

1. **Additive** – sum of individual effects (chemicals don't affect each other)
2. **Synergistic** – a response greater than the sum of the individual chemicals
3. **Antagonistic** – reduce harmful effects of chemicals

### Hazardous Chemical Classifications

1. flammable / explosive
  - benzene
  - alcohols
  - acetone
2. asphyxiants (prevent oxygen uptake)
  - carbon monoxide (CO) ← hemoglobin has a higher affinity for CO than O<sub>2</sub>
  - hydrogen cyanide
  - propane
  - methane
3. irritants – reaction after contact, but do not invoke an immune response
4. allergens – cause an immune response as a result of exposure
 

ammonia  
hydrochloric acid  
formaldehyde  
triclosan (antibacterial products)  
Bisphenol A (BPA) (plastics, can-lining)  
many, many others ...

### Toxic Chemicals (Poisons)

#### Lethal Dose – LD<sub>50</sub>

a chemical that in one dose kills 50%  
of a test population

#### EPA's "Toxic 5"

PCBs  
halogenated chlorofluoroalkanes (CFCs)  
hexavalent chromium  
dioxins  
asbestos

#### The Toxic Substances Control Act (TSCA) 1976

Its three main objectives were to:

- (1) assess and regulate new commercial chemicals before they enter the market,
- (2) to regulate chemicals already existing in 1976 that posed an "unreasonable risk to health or to the environment", as for example PCB's, lead, mercury and radon (a radioactive gas)
- (3) to regulate these chemicals' distribution and use.