



## PAH, PNA COMPOUNDS

**PAHs** - Polycyclic Aromatic Hydrocarbon compounds,  
also known as Polynuclear Aromatics (PNAs)

**They are:**

- a series of over one hundred different individual compounds
- formed during the incomplete burning of coal, gas, garbage, or other organic substances
- widely distributed in the environment
- in motor vehicle (especially diesel) exhaust
- in cigarette smoke and meat cooked at high temperatures
- byproducts of the degradation of wood and other vegetative matter
- present in creosote and as a by-product of coking operations in steelmaking
- potentially present as pollutants in water, air, soil, and industrial products

**Chemical Characteristics:**

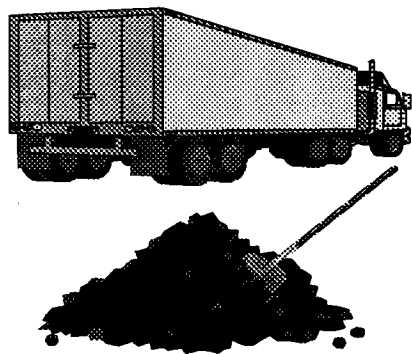
- will last in the environment for months to years
- generally occur as mixtures rather than individual PAH compounds
- adsorb readily onto solid particles such as soil, dust, and soot
- characterized by multiple fused benzene ring structures
- considered semi-volatile organic compounds
- some PAHs readily evaporate into the air
- usually solvent-extracted prior to analytical measurement
- degrade in sun/UV light

**Primary Human Health Concern:**

- health effects differ from compound to compound
- some PAH compounds can induce cancer
- the most toxic common PAH is benzo(a)pyrene
- PAHs are among the most potent known human carcinogens
- primarily attack the liver (cancer) if ingested and lungs (cancer) if inhaled

**The common PAHs include:**

(number of rings in parentheses)	benzo(k)fluoranthene - (5)
acenaphthene - (3)	chrysene - (4)
acenaphthalene - (3)	dibenz(a,h)anthracene - (5)
anthracene - (3)	fluoranthene - (4)
benzo(a)anthracene - (4)	fluorene - (3)
benzo(a)pyrene - (5)	indeno(1,2,3-cd)pyrene - (6)
benzo(b)fluoranthene - (5)	phenanthrene - (3)
benzo(g,h,i)perylene - (6)	pyrene - (4)



◆ **Definition**

◆ **Characteristics**

◆ **Health Concerns**

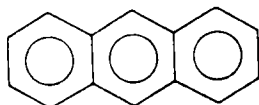
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### *Sampling and Analysis*

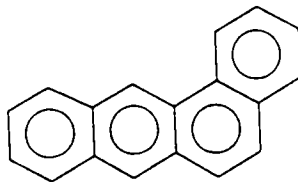
- collected from air on solid sorbent tubes or impingers
- extracted directly from soils, waters, and industrial products
- analyzed by several chromatographic methods
- some field analysis kits are available

### *Examples of the Chemical Ring Structures of several PAH Compounds:*

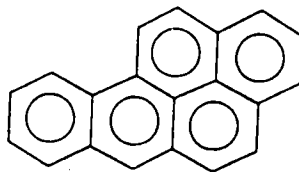
**Anthracene** - C<sub>14</sub>H<sub>10</sub> -



**Benzo(a)anthracene** - C<sub>18</sub>H<sub>12</sub> -



**Benzo(a)pyrene** - C<sub>20</sub>H<sub>12</sub> -



**Benzo(g,h,i)perylene** - C<sub>22</sub>H<sub>12</sub> -

