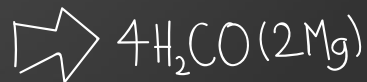
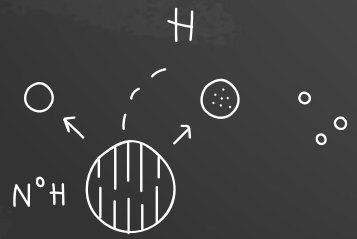
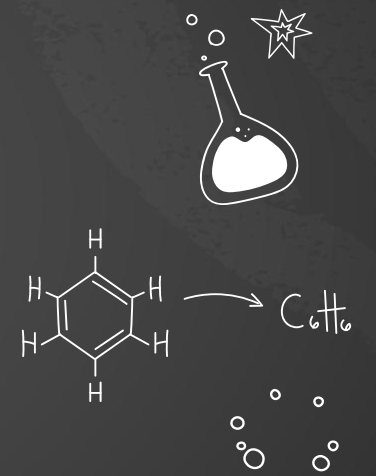
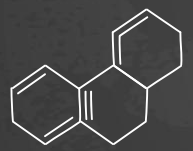




CHM 1025 Exam 1 Review

Academic Resources



Welcome!

- Drop-In Tutoring: Schedule
 - Monday and Tuesday: 1pm-5pm
 - Zoom Link
 - Friday: 1pm-3pm
 - Zoom Link
- Private Appointments: Scheduling Link

Ionic vs. Molecular Compounds

Ionic Compounds

- Ionic compounds consists of multiple elements connected by ionic bond(s)- electrostatic attraction of opposite charges
- Ionic bond= metal + nonmetal
- Naming rules
 - State cation first, then anion
 - Roman numerals can be used for ions that have multiple forms
 - This happens for cations with multiple possible oxidation states, like copper
 - Change anion ending to -ide

Covalent Compounds

- Ionic compounds consists of multiple elements connected by covalent bond(s)- sharing of electron pair(s) between atoms
- Ionic bond= metalloid + nonmetal or nonmetal + nonmetal\
- Naming rules
 - Name the non-metal furthest to the left on the periodic table by its elemental name
 - Name the other non-metal by its elemental name and an -ide ending
 - Use the prefixes mono-, di-, tri-.... to indicate the number of that element in the molecule
 - Note: if mono- is the first prefix, it is understood and not written

Prefixes for Covalent Compounds

- 1: mono-
- 2: di-
- 3: tri-
- 4: tetra-
- 5: penta-
- 6: hexa-
- 7: hepta-
- 8: octa-
- 9: nona-
- 10: deca-

How many atoms of phosphorus are in 7.9 g of P_4S_{10} ?

Compound X has three isotopes: X-28, X-29, and X-30. X-28 has a mass of 27.9769 amu and is 92.2% abundant. X-29 has a mass of 28.9765 amu and is 4.67% abundant. X-30 has a mass of 29.9737 amu is 3.10% abundant. Calculate the atomic mass of compound X.

Polyatomic Ions

Polyatomic Ions Recap

- NOT made of multiple ions
 - Covalently-bonded set of two or more atoms that holds an overall charge
- Great resource: [Symbols and Names for Common Polyatomic Ions](#)
- Understanding polyatomics differing in oxygen number
 - Most Os: per[base name]ate
 - [base name]ate
 - [base name]ite
 - Least Os: Hypo[base name]ite
 - Just remember the [base name]ate version (usually most common), and figuring other ones out will be much easier

[Base Name]ate: Chlorate (ClO_3^-)

- One more O: ClO_4^- : perchlorate
- One less O: ClO_2^- : chlorite
- One less O than chlorite: ClO^- : hypochlorite

[Base Name]ate: Sulfate (SO_4^{2-})

- One less O: SO_3^{2-} : sulfite
- Note: know how many variations of the base name exist for each polyatomic with multiple Os!

Significant Figures

Which Figures are Significant?

- All non-zero numbers
- Zeroes between two non-zero digits
- Trailing zeroes in a number with a decimal
 - To the RIGHT of the decimal
- In scientific notation, only the coefficient (the part that comes before “x10”) has significant figures

Which Figures are NOT Significant?

- Leading zeroes
 - To the LEFT of the decimal
- Trailing zeroes in numbers without decimals

Significant Figures: Rules

- ✗ Non-zero digits are always significant
- ✗ Any zeros between two significant digits are significant
- ✗ A final zero or trailing zeros in the decimal portion **ONLY** are significant
- ✗ Addition and Subtraction:
 - ✗ Count the number of significant figures in the decimal portion **ONLY** of each number in the problem
 - ✗ Add or subtract in the normal fashion
 - ✗ Your final answer may have no more significant figures **to the right of the decimal** than the **LEAST** number of significant figures in any number in the problem.
- ✗ Multiplication and Division:
 - ✗ The **LEAST** number of significant figures in any number of the problem determines the number of significant figures in the answer
 - (You are now looking at **the entire number**, not just the decimal portion)

How many significant figures are present in
the value 5.04×10^3 ?

How many significant figures are present in
the value 302,000?

How many significant figures are present in
the value 0.040?

Perform the following calculation to the correct number of significant figures.

$$[(1.7 \times 10^6) \div (2.63 \times 10^5)] + 7.33$$

Density

Density Recap

- A physical property that describes how much mass is present in a given space
- Density= mass/volume
- Example: If a cube has a side length of 5 cm and has a mass of 40g, what is its density, in g/cm³?

Diamonds are measured in carats and one carat equals 0.200 grams. The density of diamond is 3.51 g/cm^3 . What is the volume in cm^3 of a 5.0 carat diamond?

A proton has a radius of approximately 1.0×10^{-6} nm and a mass of 1.7×10^{-27} kg. Determine the density of a proton. For a sphere, $V = (4/3)\pi r^3$.

A pure titanium cube has an edge length of 2.78 in. How many titanium atoms does it contain? ($D_{\text{Ti}} = 4.50 \text{ g/cm}^3$).

$q = mc\Delta t$
practice

If you have a 688.71 g chunk of thorium ($d=11.724 \text{ g/mL}$, $C=0.12 \text{ J/g}^{\circ}\text{K}$), how hot (in K) must you heat the thorium in order for the chunk of metal to have enough energy to heat a 0.991 L sample of chloroform from 298 K to 334 K?

A student must use 225 mL of hot water in a lab procedure. Calculate the amount of heat required to raise the temperature of 225 mL of water from 20.0 °C to 100.0 °C.

A 40.0 g sample of ethanol releases 2952 J as it cools from 50.0 °C.
Calculate the final temperature of the ethanol.

Questions?