✓ Topics that include possible calculations for Midterm

1. Measurements - significant figures **– see rules (+ and -, * and /) and examples**
   - **4.29 cm x 3.2 cm = 13.728 (unrounded) = 14 cm^2 (2 sig figs)**
   - 3.56 cm
     2.6 cm
     +6.12 cm
     12.28 (unrounded) = 12.3 cm (1 decimal place)
2. Unit analysis-problem solving –**Dimensional analysis**
   - Used to solve problems (way to solve them)
     - Ex. 25,451 cm ----------> km

1 km = 10^5 cm

km cm
10^3 $10^{-2} = 10^5$

Need

1. **Conversion factor – relationship between 2 units**
2. **Given information**

$$25{,}451 \text{ cm} \times \frac{1 \text{ km}}{10^5 \text{ cm}} = 25{,}451 \times 10^{-5} \text{ km}$$

2.5451×10^{-1} km

Not in Scientific Notation

Final Answer, In Scientific Notation

- **Ex.2:** 850.00 cg → picograms (pg)
  1 cg = 10^{10} p
  (not 1 p = 10^{10} cg)
  $$850.00 \text{ cg} \times \frac{10^{10} \text{ p}}{1 \text{ cg}}$$
  850.00×10^{10} pg = **8.5000×10^{12} pg ← final answer**

3. Density **– D=m/v**

Ex.1 - What is the density of an object having a mass of 8.0 g and a volume of 25 cm^3. **A**

a. **0.32 g/cm^3**
b. 2.0 g/cm^3
c. 3.1 g/cm^3
d. 200 g/cm^3

Ex. 2 - What is the volume in cubic centimeters (cm^3) of 2.4 kg of air @ 20 °C if the density of air at this temperature is 1.20 g/L. Report your answer in scientific notation.

Can use dimensional analysis or the density formula.

Dimensional Analysis

*Remember:

1 g= 1 mL

1 cm^3 = 1 mL

1 L = 1 dm^3

$$2.4\ \text{kg} \times \frac{1000\text{g}}{1\text{kg}} \times \frac{1\text{L}}{1.20\text{g}} = 2{,}000\ \text{L}$$

2000 L= ____ mL

1 g = 1 mL

$$2000\text{L} \times \frac{1000\ \text{mL}}{1\text{L}} = 2{,}000{,}000\ \text{mL} = 2{,}000{,}000\ \text{cm}^3$$

$2.0 \times 10^6\ \text{cm}^3$

Density Formula (Involves dimensional analysis)

$$1.20\ g = \frac{2400\ g}{L} =$$

$$\frac{1.20g \times L}{1.20g} = \frac{2400g}{1.20g} = 2000\ L$$

$$2000\ L \times \frac{1000mL}{1L} = 2{,}000{,}000\ mL = 2{,}000{,}000\ cm^3$$

$$2.0 \times 10^6\ cm^3$$

6. Physical/chemical properties; changes; extrinsic and intrinsic properties; **energy (energy and change – Topic 2-I, d)**

Energy $q = m\ s\ \Delta T$

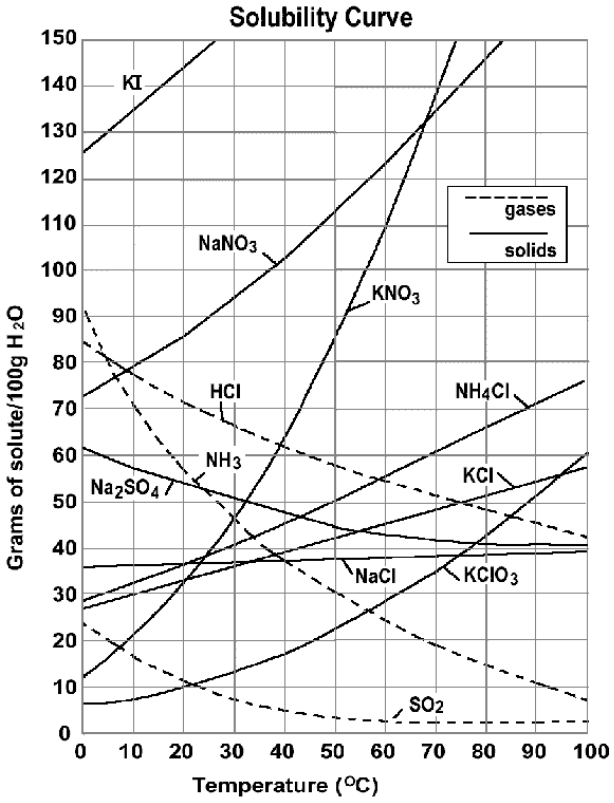
Example 40.0 g of water heated from 10.0°C to 30.0 °C

$Q = (40.0g)\ (4.1814\ J/g\ °C)(20.0°)$

$= 3347.2$ (3 sig figs) = **3350 J**

- Formula for calculating energy (heat required)
  - Q = energy (heat) required
    - Positive #= heat added/absorbed (endothermic)
    - Negative # = heat released (exothermic)
  - s = specific heat capacity (in J/g °C)
  - m = mass of the sample in grams
  - Δ T = Change in temperature (°C)
    - Final – Initial

7. Solubility & solubility curves - **see wkst**



10. Spectroscopy; light energy-waves & particles **– like wksts**
13. Atomic masses (amu units) & average atomic masses -- **The <u>Average atomic mass</u> can be calculated by multiplying the atomic mass of each isotope by its relative abundance (expressed in decimal form) and adding the results.**
14. % composition - **See nomenclature SG**
15. Molecular masses - By using the atomic masses assigned to the elements, we can find the **formula mass** of a compound. If we are sure that the formula represents the actual makeup of one molecule of the substance, the term **<u>molecular mass</u>** may be used as well.
16. The **mole**; Avogadro's Number - **What most recent test was on**
17. Avogadro's Hypothesis; molar volume; <u>density of a gas at STP</u> ✓; STP -**From most recent test on Mole Concept**
21. Molarity -**From most recent test on Mole Concept**
22. Stoichiometry of a chemical reaction – **like #26 we did in text**

Study Guide Breakdown

1-3 are Topic 1 – Chemistry?

4-8 are Topic 2 - Matter, Energy and Change

9 is topic 3 part 4 -Nuclear Chemistry

10 is Topic 3 part 2 - Bohr Model of The Atom

11 and 12 are Topic 3 part 3 – Modern Atomic Structure

13-18, 21 are Topic 4 part 2 - The Mole Concept

19 and 20 are Topic 4 part 1 – Chemical Nomenclature

22 is Topic 4 part 3(b) - Stoichiometry