

Revision Unit 1

- 1) An unknown element is found to have a relative atomic mass of 39.55 amu. It has two isotopes of relative atomic mass of 41.00 and 38.01. Find the percentage abundance of each isotope.

The formula for relative atomic mass is given below where x is the percentage abundance of isotope 41.00.

$$\Rightarrow 39.55 = ((x \times 41.00) + (38.01 \times (100 - x))) / 100$$

$$\Rightarrow 3955 = 41.00x + 3801 - 38.01x$$

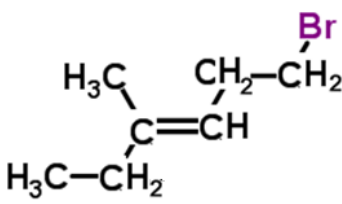
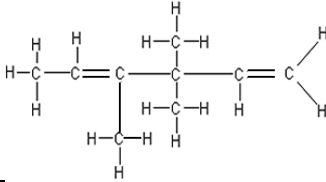
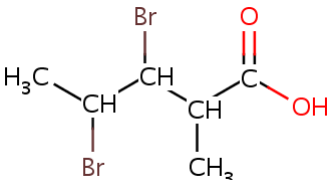
$$\Rightarrow 3955 = 2.99x + 3801$$

$$\Rightarrow 154 = 2.99x$$

$$\Rightarrow x = 51.51\%$$

Hence percentage abundance of 41.00 is 51.5% and for 38.01 it is 48.5%

- 2) Complete the table below

Name	Structural formula	Semi-structural formula
1-Bromo-4-methylhex-3-ene		<chem>CH3C(CH3)CHCH2CH2Br</chem>
3,3,4-trimethylhex-1,4-diene.		<chem>CH3CHC(CH3)C(CH3)2CHCH2</chem>
3,4-dibromo-2-methylpentanoic acid		<chem>CH3CHBrCHBrCH(CH3)COOH</chem>

- 3) The following names are poorly written. Correct each name and rewrite it.

Name	Correct name
4-methylbutanoic acid	pentanoic acid
3,4-dibromo-5-methylpentanoic acid	3,4-dibromohexanoic acid
3,methyl-2-bromopent2ene	2-bromo-3-methylpent-2-ene
2-methylbut-3-ene	3-methylbut-1-ene
6-ethylhex-2,3-diene	Oct-2,3-diene
Butan-3,4-diol	Butan-1,2-diol

I	Polar molecule.
II	Intermolecular bonding consists of dispersion forces only
III	Able to undergo addition reaction with Br ₂
IV	Unsaturated.
V	Conducts an electric current only in the molten state.
VI	Highly soluble in water.
VII	Highly soluble in oil
VIII	Intra-molecular bonds are pure covalent

- 4) For each substance listed below select that comments that apply to that substance from the list above.

Name of molecule	Comments that apply to the molecule
Ethane	II, VII
But-2-ene	II, III, IV, VII
CH ₃ OH	I, VI,
MgCl ₂	V
Cl ₂	II, VIII, VII
2-methylpropanoic acid	I, VI
Diamond	VIII

- 5) Calculate the following.

- a) The amount, in mol, of CO₂ in 66.0 grams of dry ice.
Mol = mass / formula mass = 66.0 / 44.0 = 1.5 mol
- b) The mass of 0.65 mol of CuSO₄·5H₂O
Formula mass of CuSO₄·5H₂O = 63.55 (Cu) + 32.07 (S) + 4 × 16.00 (O) + 5 × [2 × 1.01 (H) + 16.00 (O)] = **249.72 g /mol.**
Mass = mol X formula mass = 0.65 X 249.72 = 162.32g
- c) The number of water molecules in 0.34 mol of CuSO₄·5H₂O
Step 1 Calculate the mol of H₂O => 0.34 X 5 = 1.7 mol
Step 2 Calculate the number => 1.7 X 6.02 X 10²³ = 1.02 X 10²⁴
- d) The mass of water, in grams, present in 78.0 grams of CuSO₄·5H₂O.
Step 1 Find the percentage composition of water in CuSO₄·5H₂O
=> (90/249.72) X 100 = 36.04%
Step 2 find the mass of water in 78.0 grams of CuSO₄·5H₂O
=> 78.0 X 36.04/100 = 28.1 g