

Core Worksheet – Chapter 3

- 1** Classify the following as ionic or covalent compounds: [5]
- | | | |
|--|---------------------------|--|
| a NaCl | c CaF ₂ | e N ₂ H ₄ |
| b C ₃ H ₈ | d K ₂ O | |
- 2** Give the formulas of the ions formed by the following: [8]
- | | | |
|-------------|-------------|-------------|
| a Ca | d Br | g Rb |
| b F | e S | h Al |
| c P | f Sr | |
- 3** Draw diagrams, showing outer shell electrons only, to show formation of the following ionic compounds: [4]
- | | |
|----------------------------|--|
| a KF | |
| b Li ₂ O | |
- 4** Give the formulas of the following ionic compounds: [6]
- | | |
|-----------------------------|------------------------------|
| a sodium bromide | d ammonium sulfate |
| b calcium iodide | e silver nitrate |
| c rubidium phosphate | f potassium carbonate |
- 5** **a** Explain why ionic compounds have high melting points. [1]
- b** Explain as far as possible the following data: [3]
- | Compound | Melting point / °C |
|------------------|--------------------|
| sodium chloride | 801 |
| magnesium oxide | 2852 |
| calcium oxide | 2614 |
| caesium chloride | 645 |
- 6** Explain what is meant by a **covalent bond**. [1]
- 7** Draw Lewis structures for the following molecules: [11]
- | | | |
|----------------------------|--|--|
| a H ₂ O | e PF ₃ | i H ₂ O ₂ |
| b NH ₃ | f BF ₃ | j CO |
| c Cl ₂ O | g C ₂ H ₄ | k O ₃ |
| d CO ₂ | h N ₂ H ₄ | |
- 8** Draw Lewis structures for the following ions: [6]
- | | | |
|--|---------------------------------------|--|
| a OH ⁻ | c NH ₄ ⁺ | e NO ₂ ⁻ |
| b CO ₃ ²⁻ | d NO ₂ ⁺ | f SO ₄ ²⁻ |

- 9 Work out the shapes and predict bond angles for the following molecules: [22]
- | | | | | | |
|---|-------------------|---|-------------------------------|---|-------------------------------|
| a | H ₂ O | e | PF ₃ | i | H ₂ O ₂ |
| b | NH ₃ | f | BF ₃ | j | O ₃ |
| c | Cl ₂ O | g | C ₂ H ₄ | k | H ₂ S |
| d | CO ₂ | h | N ₂ H ₄ | | |
- 10 Predict the shapes and suggest bond angles for the following ions: [8]
- | | | | |
|---|-------------------------------|---|------------------------------|
| a | CO ₃ ²⁻ | c | NO ₂ ⁺ |
| b | NH ₄ ⁺ | d | NO ₂ ⁻ |
- 11 Explain what is meant by **electronegativity**. [1]
- 12 Select the polar molecules from the following list. For the polar molecules draw diagrams showing the dipoles. [8]
- | | | | | |
|------------------|-----------------|-------------------|-----------------|-----------------|
| H ₂ O | NH ₃ | Cl ₂ O | CF ₄ | CO ₂ |
| PF ₃ | BF ₃ | H ₂ | N ₂ | O ₃ |
- 13 Br₂ and ICl have roughly the same relative molecular masses. Predict and explain which has the higher boiling point. [4]
- 14 The boiling points of the hydrides of group 5 are shown in the table below. Plot this data on a suitable graph and explain the trends shown. [5]
- | Compound | Boiling point / °C |
|------------------|--------------------|
| NH ₃ | -33 |
| PH ₃ | -88 |
| AsH ₃ | -62 |
| SbH ₃ | -18 |
- 15 a Draw a sketch of the structure of diamond and use it to explain why diamond has a very high melting point. [4]
- b Explain why silicon has a lower melting point than diamond. [3]
- c Explain how the structure of graphite differs from that of diamond. [4]
- 16 a Explain, using a diagram, the bonding in a metal such as sodium. [2]
- b Explain why magnesium has a higher melting point than sodium. [4]