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VCE Chemistry ½
Ionic Compounds [1.5]
Homework

Homework Outline:

Compulsory	Pg 2 – Pg 8
Supplementary	Pg 9 – Pg 17



Section A: Compulsory (43 Marks)

Sub-Section: Write the Formula of Simple & Complex (Containing Polyatomic and Transition Metal Ions) Ionic Compounds and Be Able To Name Them

Question 1 (4 marks)



For the following pairs of elements, write the formula of the ionic compound they will form:

a. Ca and Cl. (1 mark)

b. Br and K. (1 mark)

c. Mg and O. (1 mark)

d. S and Na. (1 mark)

Question 2 (4 marks)



Write the formula for the ionic compound that is formed between the following:

a. Cu^{2+} and Cl. (1 mark)

b. Fe^{2+} and PO_4^{3-} . (1 mark)

c. Cl and NH_4^+ . (1 mark)

d. Ca and CO_3^{2-} . (1 mark)

Question 3 (3 marks)



Explain why we observe ionic compounds to be between metals and non-metals.

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Sub-Section: Explain the Structure of Ionic Compounds and Be Able To Draw Electron Transfer Diagrams

Question 4 (3 marks)



Explain what occurs when an atom of Na bonds to an atom of Cl to form NaCl.

Question 5 (3 marks)



The following compound, BaO, is to be investigated.

a. Name the compound. (1 mark)

b. Draw the lattice structure of this compound, containing 2 atoms of each ion. (2 marks)

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Question 6 (7 marks)

Consider a molecule of NaCl.

- a. State the bonding that holds the NaCl bonds together. (1 mark)

- b. Now, consider a molecule of HCl, state what bonds hold this molecule together. (1 mark)

- c. Explain what happens as a result of the bonds formed to hold HCl together. (2 marks)

- d. Hence, or otherwise, of the two molecules, which one do you think will exhibit stronger charge? Justify your answer. (3 marks)

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Sub-Section: Explain the Properties of Ionic Compounds (Hardness, High MP/BP, Brittleness, Electrical Conductivity in Various States), With Reference To Their Structure and Bonding

Question 7 (2 marks)



Briefly explain why in cooking you can 'burn' sugar but you never seem to burn salt.

Question 8 (3 marks)



Explain why not all molecules can be covalently bonded molecules, giving an example.

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Question 9 (4 marks)

When a block of Fe and a block of CuCl_2 are both struck with an external force, compare and explain what happens to each block, with reference to their relative lattice structures.

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Sub-Section: Final Boss

Question 10 (10 marks)



Consider ceramic, which is a composite material that is comprised of a mix of different ionic compounds, and iron.

- a. Which material is more suitable to be used as a cooking utensil dealing with extremely high temperatures? Justify your answer. (4 marks)

- b. Which material is more suitable for usage as cookware instead of cooking utensils? Justify your answer. (3 marks)

- c. Imagine you had two bowls in your house, one made of iron and the other ceramic, which one would you place on a lower shelf level and why? (3 marks)

Section B: Supplementary (62 Marks)

Sub-Section: Write the Formula of Simple & Complex (Containing Polyatomic and Transition Metal Ions) Ionic Compounds and Be Able To Name Them

Question 11 (4 marks)



Write the formula for the ionic compound that is formed between the following:

a. Na and NO_3^- . (1 mark)

b. K and SO_4^{2-} . (1 mark)

c. CO_3^{2-} and Mg. (1 mark)

d. SO_3^{2-} and Ca. (1 mark)

Question 12 (4 marks)



Find the valency of the metal ion in the following ionic compounds.

a. $\text{Fe}_2(\text{SO}_4)_3$. (1 mark)

b. AgCl_2 . (1 mark)

c. $\text{Sn}(\text{NO}_3)_4$. (1 mark)

d. CuBr . (1 mark)

Question 13 (6 marks)



For each of the following ionic compounds, find the valency for all of the elements in the compound.

a. $\text{K}_2\text{Cr}_2\text{O}_7$. (2 marks)

b. $\text{Ag}(\text{NH}_3)_2^+$. (2 marks)

c. $[\text{Pt}(\text{NH}_3)_4]\text{Cl}_2$. (2 marks)

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Question 14 (8 marks)

A student was tasked with writing formulas for ionic compounds but made several mistakes. Identify and correct the errors below, justifying your corrections:

a. NaSO_4 for sodium sulphate. (2 marks)

b. $\text{Mg}_3(\text{PO}_4)$ for magnesium phosphate. (2 marks)

c. $\text{Fe}(\text{NO}_3)_2$ for Iron (III) nitrate. (2 marks)

d. $\text{Al}(\text{SO}_4)_2$ for aluminium sulphate. (2 marks)

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Sub-Section: Explain the Structure of Ionic Compounds and Be Able To Draw Electron Transfer Diagrams

Question 15 (3 marks)



Write the formula of the compound formed from calcium and oxygen, naming the compound and explaining how this compound exists in real life

Question 16 (4 marks)



You're exploring ionic compounds in your chemistry project and encounter magnesium chloride.

a. Write the molecular formula. (1 mark)

b. Draw the ionic lattice structure of magnesium chloride, showing at least two magnesium ions and four chloride ions. Label the forces between the ions. (3 marks)

Question 17 (7 marks)


- a. What is the molecular formula and name of the compound that forms between phosphate ions and potassium ions? (2 marks)

- b. Draw the ionic lattice structure that forms above, showing at least two sets of the substance according to the molecular formula. (3 marks)

- c. Compare the bonding present in (**part b.**) with the bonding that is present within a molecule of HCl. (2 marks)

Question 18 (7 marks)


Consider an atom of K and an atom of F.

- a. Explain how they would form an ionic compound. (3 marks)

b. Now, consider the ions K^+ and F^- . Explain how they would form an ionic compound. (2 marks)

c. Are both resulting compounds the same? Justify your answer. (2 marks)

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**Sub-Section: Explain the Properties of Ionic Compounds
(Hardness, High MP/BP, Brittleness, Electrical Conductivity in Various States), With
Reference To Their Structure and Bonding**

Question 19 (3 marks)


Explain what happens when a block of NaNO_3 is struck with an external force, stating the property this phenomenon can be described with.

Question 20 (3 marks)


Between the same amount of molecules of NaCl and CuCl_2 , explain which one would have a higher boiling point.

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Question 21 (5 marks)


Consider a block of copper and a block of salt.

- a. Explain why a solid block of copper is able to conduct electricity, however when we use a block of salt, it doesn't work. (3 marks)

- b. Suggest and explain how salt could conduct electricity. (2 marks)

Question 22 (8 marks)


Ionic compounds are used in various industries due to their unique properties. A scientist is studying the properties of ionic compounds with regard to magnesium oxide.

- a. Magnesium oxide has a significantly higher melting point when compared to sodium chloride. Explain this difference. (3 marks)

- b. Explain what conditions should be met for magnesium oxide to conduct electricity. (3 marks)

- c. In industry, operating costs of maintaining conditions such as temperature must be considered. Out of the methods in (**part b.**), which one is less costly and why? (2 marks)

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