**CHEMICAL BONDING QUESTIONS**

1. **MULTIPLE CHOICE QUESTIONS**
2. If two electrons are transferred from an atom of *X* to an atom of *Y* to form a compound, then:
3. The formula of the compound will be *X2Y2.*
4. The compound will be composed of *X2+* and *Y2*- ions.
5. The solid compound will conduct electricity.
6. The compound will be composed of *X2-* and *Y2+.*
7. The table below lists some properties of two chlorine compounds.

|  |  |  |  |
| --- | --- | --- | --- |
| Compound | Melting point | Conductivity in aqueous solution | Conductivity in the liquid state |
| Hydrogen Chloride  Potassium chloride | -114oC  770oC | Very good  Very good | Nil  Very good |

The reason for the difference in melting points is that:

1. The covalent bonds present in HCl are weaker than the ionic bonds present in KCl.
2. The ionic bonds present in HCl are weaker than those present in KCl.
3. The intermolecular forces (van der Waals forces) present in KCl are stronger than those present in HCl.
4. The intermolecular forces present in HCl are weaker than the ionic bonds present in KCl.
5. The complete combustion of ethanol is represented by the following equation:

C2H5OH(l) + 302(g) → 2CO2(g) + 3H2O(g)

During this reaction:

1. Only covalent bonds break.
2. Intermolecular forces and covalent bonds break.
3. Only intermolecular forces break.
4. Ionic bonds break.
5. In the formation of a covalent bond:
6. Electrons are totally transferred from one atom to another.
7. All the electrons in one atom are shared with those of another.
8. The electrons in the outer shells *only* are shared.
9. The electrons do not move from their original positions.
10. In which of the following processes do ionic bonds break?
11. Melting of copper.
12. Sublimation of ‘dry ice’ (solid CO2).
13. Melting of silicon dioxide.
14. Electrolysis of lead (II) bromide.
15. Which of the following substances would possess the highest melting point?
16. Silicon carbide.
17. Copper.
18. Potassium fluoride.
19. Calcium carbide.
20. Which of the following conducts electricity in the molten *and* solid states?
21. Sodium chloride.
22. Graphite.
23. Sodium.
24. Silicon.
25. Which of the following is an example of a process in which intermolecular forces (van der Waals forces) are *formed*)?
26. The condensation of water.
27. The reaction between sodium and hydrogen to form sodium hydride.
28. The solidification of strontium nitrate.
29. The formation of hydrogen chloride from hydrogen and chlorine.
30. Molten lithium fluoride is a better conductor of electricity than liquid hydrogen fluoride, because lithium fluoride:
31. Has a higher melting point.
32. Has mobile charge carriers.
33. Allows electrons to pass through it easily.
34. Is a more negatively charged substance.
35. Which of the following is *not* an empirical formula?
36. CO2
37. C3H8
38. CH3
39. C4H10
40. **SHORT ANSWER QUESTIONS**
41. An element *A* is known to be a metal. It is burnt in air to form a white, powdery compound.
42. Name one experimental test, *and its result*, which you could perform on the compound to show that element *A* is a metal.
43. Explain the reason for your choice of test.
44. The two compounds selenium dioxide, SeO2 and silicon dioxide, SiO2 do not conduct electricity in the molten state. It is not possible, therefore, to use this property to distinguish between the two.
45. Explain *why* these compounds do not conduct electricity in the molten state.
46. State physical property that would be different for these two compounds. Explain why this property is different.
47. What do the following properties indicate about the nature of a substance?
48. Melting point.
49. Electrical conductivity when molten.
50. Powdered sulphur and lead (II) iodide are similar looking yellow solids. For these two solids, state one different:
51. *Physical* property.
52. *Chemical* property.
53. An element *X* reacts with another element *Y* to form a compound with the formula *XY2*. Some properties of *X, Y2* and *XY2* are listed below.

|  |  |  |  |
| --- | --- | --- | --- |
| Substance | Melting point  (0C) | Electrical conductivity | |
| Of solid material | Of molten material |
| *X*  *Y2*  *XY2* | 1018  88  935 | High  None  None | High  None  High |

1. What type of particles move when a voltage is applied to:
2. Solid *X*?
3. Molten *XY2*?
4. Explain the relatively high melting point of *XY2*.
5. Which bonds or forces are breaking when solid *Y2* melts?
6. Some physical properties of the oxides of elements *X, Y* and *Z* are given below.

|  |  |  |
| --- | --- | --- |
| Formula of oxide | Melting point  (0C) | Appearance at room temperature |
| *X2O*  *Y2O*  *ZO* | 1230  0  2570 | Red solid  Colourless liquid  White solid |

1. Discuss each of the following for these three oxides:
2. Type(s) of bonding present.
3. Nature of the particles present.
4. State whether each oxide will conduct electricity in the molten state.
5. From a consideration of its properties, state the possible identity of the oxide of *Y*.
6. Consider the following properties of bromine monochloride, bromine and chlorine.

|  |  |  |  |
| --- | --- | --- | --- |
| Substance | Colour | Reaction of heating | |
| Bromine monochloride | Light orange | Melts at -660C | Decomposes at 100C |
| Bromine | Red | Melts at -70C | Boils at 580C |
| Chlorine | Yellowish green | Melts at -1010C | Boils at -350C |

1. State what is observed, giving a reason, in a sample of bromine monochloride at:
2. 50C
3. Room temperature
4. 800C
5. Compare the strengths of the two types of bonds/forces present in bromine monochloride, and relate these to the data given above.