| AECHE2020  **Narrogin SHS Year 11 ATAR CHEMISTRY Name:** | |
| --- | --- |
| Task No: | 11 |
| Task Type: | Test |
| Content: | Water, solutions and intermolecular forces |
| Task Description: | Complete the attached questions on the multiple choice answer sheet or in the spaces provided.  Marks will be awarded for presentation and working.  **Test conditions (50 minutes).**  *Formulae and data booklet provided.*  *Non-programmable calculator permitted.* |
| Total Marks: | 30 |
| Weighting: | 2.15% |
| Due Date: | 28 July 2020 |

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**Multiple Choice Answer Sheet**

**Task Number: \_\_ Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Year: \_\_**

**Multiple Choice – 15 Questions**

Circle your choice. If you change your mind, erase or cross your choice out and circle the one you want. If it is messy, clearly write your choice next to question.

1. A B C D 11. A B C D

2. A B C D 12. A B C D

3. A B C D 13. A B C D

4. A B C D 14. A B C D

5. A B C D 15. A B C D

6. A B C D

7. A B C D

8. A B C D

9. A B C D

10. A B C D

**Section 1: Multiple Choice** (1 mark each)

*Indicate your answers on the multiple choice answer sheet*

1. Which of the following processes is not considered necessary for purification of groundwater or sea water to produce potable water, but may be done for other reasons?
2. desalination
3. chlorination
4. testing for heavy metals
5. fluoridation
6. Determine the concentration of chloride ions in 20 mL of a 0.50 mol L-1 solution of aluminium chloride.
7. 0.50 mol L-1
8. 1.00 mol L-1
9. 1.50 mol L-1
10. 2.00 mol L-1
11. Which of the following is not an effective method for removing heavy metal contamination from water?
12. biosorption
13. photoremediation
14. nanofiltration
15. chromatography
16. The boiling points of HCl, HBr and HI are –85, -67 and –35oC respectively. Which of the following statements best explains these different melting points?
17. The strength of dispersion forces increases as the number of electrons present in a molecule increases.
18. The strength of hydrogen bonding increases as the number of electrons in a molecule increase.
19. The molecules become more polar as the number of electrons present increases.
20. The strength of hydrogen bonds decreases as the number of electrons present in a molecule increases
21. Which of the following compounds has a melting point which is significantly influenced by hydrogen bonding?
22. F2O
23. CH3NH2
24. PH3
25. H2S
26. Below 19oC HF exists as a crystalline molecular solid. The bonding that holds the HF molecules into the lattice is best described as
27. dispersion forces plus hydrogen bonding.
28. ionic bonding plus hydrogen bonding.
29. ionic bonding only.
30. hydrogen bonding only.
31. Paper chromatography may be used to separate food dyes or inks. The stationary phase of this type of chromatography is

1. Water
2. Dye or ink
3. Paper
4. Colour
5. High performance liquid chromatography (HPLC) uses pressurised solvent to force samples through tiny silica particles in fine column. This separation depends on which property of the sample molecules?
6. Size
7. Solubility
8. Boiling point
9. Polarity
10. Study the table below showing some data for the halogens.

|  |  |  |  |
| --- | --- | --- | --- |
| **HALOGEN** | **ATOMIC NUMBER** | **MOLECULAR MASS** | **MELTING POINT (oC)** |
| F2 | 9 | 38 | -220 |
| Cl2 | 17 | 71 | -101 |
| Br2 | 35 | 160 | -7 |
| I2 | 53 | 254 | 114 |

Which one of the following statements best explains why the melting points of the halogens increase with increasing atomic number?

a) The number of electrons increases, resulting in the formation of more covalent bonds.

b) The number of electrons increases, resulting in stronger dispersion forces between molecules.

c) The increased number of electrons causes the molecules to be more polar.

d) As the molecular masses increase, so too do the sizes of the molecules, resulting in stronger ionic bonds between the ions.

1. Which one of the elements below is the most electronegative?

a) F

b) Cl

c) Br

d) I

1. Which one of the following substances would be least soluble in water?

a) NH3

b) HF

c) CH3COOH

d) C4H10

1. Which one of the following substances would have molecules that are polar?

a) Cl2

b) CH4

c) PCl3

d) BF3

1. Which one of the following molecules has a v-shape (bent)?

a) O3

b) BeF2

c) CO2

d) NH3

1. Which one of the following substances would you expect to be least soluble in water?

a) ethane, C2H6.

b) Ethanol, C2H5OH

c) Ethanal,, CH3CHO

d) Diethyl ether, CH3CH2OCH2CH3

1. The table below shows the molar heats of fusion and vaporisation of five common substances.

|  |  |  |
| --- | --- | --- |
| **Substance** | **molar heat of fusion**  **(kJ mol-1)** | **molar heat of vapourization (kJ mol-1)** |
| Hydrogen | 0.1 | 0.4 |
| Methane | 1 | 8 |
| Water | 6 | 41 |
| Ammonia | 6 | 23 |
| Sodium chloride | 28 | 170 |

Which of the following, lists these substances in order of *increasing* boiling point?

a) Sodium chloride, water, ammonia, methane and hydrogen.

b) Hydrogen, methane, ammonia, water and sodium chloride.

c) Hydrogen, methane, water, ammonia and sodium chloride.

d) Methane, hydrogen, water, ammonia and sodium chloride.

**Section 2: Short Answer**

*Write your answer in the spaces provided*

|  |  |  |
| --- | --- | --- |
| 1. 2.50 g of sodium chloride is dissolved in 320mL (320g) of water. Determine the concentration of the solution in (3 marks) 2. gL-1 3. mol L-1 4. ppm 5. Draw an electron dot diagram for each species: (12 marks) | | |
| sulfur dioxide SO2 | silicon tetrachloride SiCl4 | ammonia NH3 |
| State the molecular shape for any covalent molecules or write “not molecular” for non-covalent compounds | | |
|  |  |  |
| On the diagram above, indicate dipole directions for any polar molecules or write “no dipole” for non polar molecules | | |
|  |  |  |
| State the bonding type which most influences the boiling point of each | | |
|  |  |  |

**END OF TEST**