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VCE Chemistry ½
AOS 1 Revision I [1.12]
Test

30 Marks. 1 Minute Reading. 20 Minutes Writing

Results:

Test Questions	_____ / 25
Extension	_____ / 5

Section A: Test Questions (25 Marks)

Question 1 (3 marks)

Tick whether the following statements are **true** or **false**.

	True	False
a. Chlorine is typically unstable on its own as it has 7 electrons in the outer shell.		
b. Noble gases do not react with any other atom since they already have a full valence shell according to the octet rule.		
c. Hydrogen only has one valence electron, and so needs 7 more electrons in order to become stable.		
d. First ionisation energy decreases as you move across a period from left to right.		
e. Electronegativity refers to the ability of an atom to attract electrons towards itself.		
f. The cesium atom has an effective nuclear charge of +1 whereas the bismuth atom has an effective nuclear charge of +6.		

Space for Personal Notes

Question 2 (7 marks)

Jay is investigating the structure of atoms to prepare for his first chemistry SAC. To do this, he looks at a single oxygen atom, as presented on the periodic table.

a. What are the charges of protons and neutrons? (1 mark)

_____

_____

b. According to the Rutherford model, explain the structure of an oxygen atom. (2 marks)

_____

_____

_____

_____

c. With reference to the same model, explain why dispersion forces can form. (1 mark)

_____

_____

d. How many protons and electrons are expected in a standard ^{16}O atom? (1 mark)

_____

_____

e. After taking a strong interest in the findings of Ernest Rutherford, Jay decides to replicate his famous gold foil experiment. What did this experiment reveal about atoms, and how? (2 marks)

_____

_____

_____

Question 3 (3 marks)

Nitrogen and oxygen are two of the most prominent gases which make up around 99% of the total gas volume in the atmosphere. Both molecules are essential to life on Earth and are used for various purposes.

a. Explain whether oxygen gas and nitrogen gas are polar. (1 mark)

_____

_____

b. Oxygen atoms are not found in their single state in nature and instead are almost always found in a diatomic state, such as in $O_2(g)$. Explain this observation. (2 marks)

_____

_____

_____

_____

Question 4 (4 marks)

State the parent and molecular geometry of the following:

a. CH_4. (1 mark)

Parent Geometry	Molecular Geometry

b. HCN. (1 mark)

Parent Geometry	Molecular Geometry

c. NH_3. (1 mark)

Parent Geometry	Molecular Geometry

d. NOBr. (1 mark)

Parent Geometry	Molecular Geometry

Question 5 (5 marks)

Alexander wants to examine hydrogen bonding more in-depth in a chemistry lab.

a. State what is required for a hydrogen bond. (1 mark)

_____

_____

b. Can a molecule such as HCl form hydrogen bonds? Explain your answer. If no, identify the strongest type of intermolecular force that will be present. (2 marks)

_____

_____

_____

c. Would Alex expect a change if he put HCl and H_2O together? Justify your answer. (2 marks)

_____

_____

_____

Question 6 (3 marks)

Between CO_2 and C_2H_6, predict which one has a higher boiling point and explain your answer.

Space for Personal Notes

Section B: Extension (5 Marks)

Question 7 (1 mark)

For an atom of Be, which statement is the MOST correct?

A. The valence electrons will be very difficult to remove as the atomic radius is small, thereby the nucleus will hold onto them strongly.

B. The valence electrons will want to achieve a full outer shell and will gain 6 electrons to do so.

C. The valence will be very easy to remove as the atomic radius is small, but the nucleus is also very small.

D. The Be atom will want to achieve a full outer shell and will lose 2 electrons to do so.

Question 8 (1 mark)

Which of the following molecules have a trigonal planar molecular geometry?

A. NH_3

B. BeF_2

C. BF_3

D. NO_2

Question 9 (1 mark)

Which of the following bonds are considered the least polar?

A. $O-H$

B. $N-H$

C. $H-F$

D. $H-Cl$

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Question 10 (1 mark)

Which of the following gives the correct shape for each of the molecules listed?

	Linear	V-shaped	Tetrahedral
A.	H_2O	NH_3	CH_4
B.	H_2	CO_2	NH_3
C.	HF	H_2O	NH_3
D.	CO_2	H_2S	CH_4

Question 11 (1 mark)

An unknown molecule is known to be polar in nature. It contains at least one oxygen atom. All of the following statements about the atom must be true except:

A. The molecule will form dispersion forces with itself.

B. The molecule will form dispersion forces and dipole-dipole attractions with itself.

C. The molecule will form dispersion forces, dipole-dipole attractions and hydrogen bonding with itself.

D. The molecule has a net dipole.

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