UNIVERSITY OF VICTORIA

CHEMISTRY 101
Properties of Materials

Midterm Test 2
November 2, 2018
6-7 pm
ECS 123, BWC B150, BWC A104 or DTB A120

VERSION A

Display your student ID card on your desk.

Do not begin until instructed by the invigilator.

Print and code your last name, first name, and your student ID number on the blue bubble sheet.

This test has 22 multiple choice questions on 6 pages.

A Data Sheet is provided.

The Sharp EL510, Sharp EL510 RNB (also EL510 RN), and Sharp EL510 RTB (also EL510 RT) are the only approved calculators for this test.

Select the best response for each question and record your answer on the blue bubble sheet.

Hand in the blue bubble sheet at the end of the test.

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1. Using the titration reaction equation below, what volume of 0.05823M NaOH is required to reach the endpoint with 0.6131 g of $KHC_8H_4O_4$ (MW = 204.23g. mol^{-1}), using phenolphthalein (MW = 318.32g. mol^{-1}) as an indicator?

$$NaOH\ (aq) + KHC_8H_4O_4\ (aq) \rightarrow H_2O\ (aq) + KNaC_8H_4O_4\ (aq)$$

A) 3.002×10^{-3} L
B) 0.3002 L
C) 20.23 mL
D) 51.55 mL
E) 5.155×10^{-2} mL

0.003002 mols $KHC_8H_4O_4$

= 0.05155 L

2. Which of the following orbitals does not adopt a degenerate set in a free atom?

A) 3p B) 4d C) 5f D) 1s E) 2p

3. Which of the elements listed below contains a valence electron with the set of quantum numbers $\ell = 1$, $m_\ell = 1$, $m_s = +1/2$?

A) As (arsenic) #33
B) Cs (cesium) #55
C) Sc (scandium) #21
D) Tb (terbium) #65
E) Ag (silver) #47

4. Which of the elements listed below is a member of the s block?

A) Si (silicon) #14
B) Se (selenium) #34
C) Sn (tin) #50
D) S (sulfur) #16
E) Sr (strontium) #38

5. Which of the following pairs of atoms and ions are isoelectronic?

A) As^{3-} and Ge^{2-}
B) Se^{2-} and Br^{-}
C) Na^{+} and Mg
D) Ca^{2+} and K
E) Cr^{2+} and Mn^{+}

$As^{3-} + Ge^{2-}$

what is isoelectronic though? haha I fucked up lol

6. Which of the following atoms has the largest atomic radius?

A) thallium (Tℓ) B) boron (B) C) gallium (Ga) D) indium (In) E) aluminum (Al)

7. Which of the following atoms has the highest electronegativity?

A) Se B) As C) Br D) Ge E) Ga

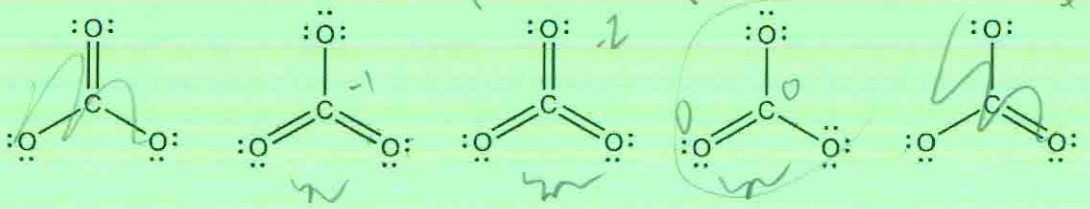
8. Which of the following atoms or ions has the highest ionization energy?

A) Na B) Al C) Si D) P^{3-} E) Mg^{2+}

9. Which of the following ions is expected to have the largest radius in the gas phase?

A) Sb^{3-} B) In^{+} C) Br^{-} D) Te^{2-} E) Sn^{2+}

19. Which of the drawings below is the best Lewis structure for carbonate anion $[CO_3]^{2-}$?



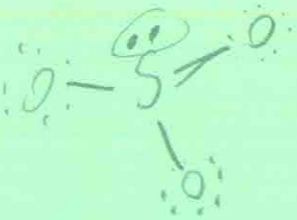
A) B) C) D) E)

20. Which of the following molecules is planar?

A) CF_4 B) SF_4 C) PF_3 D) IF_5 E) XeF_4

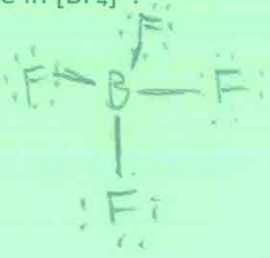
21. What is the most likely molecular shape for $[SO_3]^{2-}$?

A) trigonal pyramid
B) trigonal planar
C) tetrahedral
D) linear
E) trigonal bipyramid



22. What is the most likely F-B-F bond angle in $[BF_4]^-$?

A) approx. 90°
B) approx. 109°
C) approx. 120°
D) approx. 90° and 120°
E) approx. 180°



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