

PHYSICAL SCIENCE
982-021-06 (982-020-03) Section C2
Winter 2006

Quiz #2
March 29, 2006

Name _____

ID Number _____

MULTIPLE CHOICE: [2 MARKS EACH]

(Circle the letter of the one alternative that best completes the statement or answers the question)

1. Which would you expect to have a higher melting point: sodium chloride, NaCl, or aluminum oxide, Al₂O₃? Why?

- a) The aluminum oxide has a higher melting point because of the greater charges of the ions, and hence the greater force of attractions between them.
- b) NaCl has a higher boiling temperature because it is a solid at room temperature.
- c) The aluminum oxide has a higher melting point because it is a larger molecule and has a greater number of molecular interactions.
- d) The aluminum oxide has a higher melting point because of the covalent bonds within the molecule.

2. Is it possible for induced dipole-induced dipole attractions to occur between water molecules?

- a) No, only dipole-dipole attractions occur between water molecules.
- b) No, we cannot induce a dipole in a molecule that already has a dipole.
- c) No, dipole-induced dipole interactions are possible but not induced dipole-induced dipole.
- d) Yes, induced dipole-induced dipole attractions are always present because the strength of a dipole varies due to the spontaneous motion of electrons.

3. How many electrons are shared in a single covalent bond?

- a) 6
- b) 2
- c) 1
- d) 4

4. The greater the difference in electronegativity between two covalently bonded atoms,

a) the closer together the atoms are located on the periodic table.

b) the greater the polarity.

c) the smaller the polarity.

d) Two of the above are correct.

5. Which of these covalent bonds is most polar?

a) F-F

b) F-S

c) F-O

d) F-As

6. Water, H_2O , and methane, CH_4 , have about the same mass and differ by only one type of atom. Why is the boiling point of water so much higher than that of methane?

a) The oxygen of a water molecule has two lone pairs of electrons.

b) The electronegativity difference between oxygen and hydrogen is greater than the electronegativity difference between carbon and hydrogen.

c) The water molecule is less symmetrical than is the methane molecule.

d) all of the above

7. If gallium ions have a 3^+ charge and sulfur ions have a 2^- charge, the compound gallium sulfide is

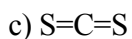
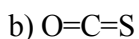
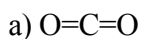
a) Ga_2S_3

b) Ga_4S_3

c) Ga_3S_2

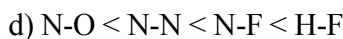
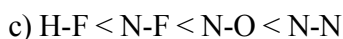
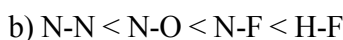
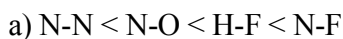
d) Ga_6S_6

8. Which molecule is most polar?



d) These all have the same polarity.

9. Which of the following lists the bonds in the correct order of decreasing polarity?



10. An inventor claims to have developed a new perfume that lasts a long time because it doesn't evaporate. Comment on this claim.

a) This product is sure to sweep the market making many happy customers.

b) In order to smell something, the molecules must evaporate and reach your nose. If the new perfume doesn't evaporate, it will not have an odor.

c) A perfume that does not evaporate could be toxic since the molecules never leave the skin.

d) This would be impossible to make because the perfume would have to be pressurized in order to not evaporate.

11. What type of bonding might you expect between two potassium atoms (K, atomic #19)?

a) polar covalent

b) metallic

c) nonpolar covalent

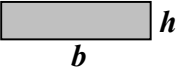

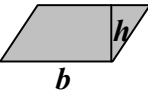
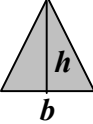

d) ionic

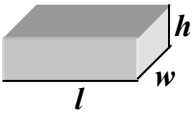



SHORT ANSWER [4 MARKS EACH; EXPLAIN YOUR ANSWER IN DETAIL]:

1. Which should be the larger molecule and hence exhibit greater induced dipole-induced dipole molecular interactions: dichloromethane, CH_2Cl_2 , or carbon tetrachloride, CCl_4 ?

2. Which should be the more polar molecule and hence exhibit greater dipole-dipole molecular interactions: dichloromethane, CH_2Cl_2 , or carbon tetrachloride, CCl_4 ?

PHYSICAL SCIENCE FORMULA SHEET

Shape	Name	Formula
	Rectangle	bh
	Square	s^2
	Parallelogram	bh
	Triangle	$\frac{1}{2}bh$
	Circle	πr^2

Shape	Name	Formula
	Box	lwh
	Cube	s^3
	Cylinder	$\pi r^2 l$
	Sphere	$\frac{4}{3}\pi r^3$

Quadratic Formula

to solve an equation of the form

$$ax^2 + bx + c = 0$$

use

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Half-life

$$\text{Amount Remaining} = \text{Initial Amount} \times \left(\frac{1}{2} \right)^{\left(\frac{\text{total time elapsed}}{\text{half-life}} \right)}$$

PERIODIC TABLE OF THE ELEMENTS

1 1.0079 H hydrogen hydrogène																	2 4.003 He helium hélium						
3 6.941 Li lithium lithium	4 9.012 Be beryllium béryllium																	5 10.811 B boron bore	6 12.011 C carbon carbone	7 14.007 N nitrogen azote	8 15.9994 O oxygen oxygène	9 18.998 F fluorine fluor	10 20.18 Ne neon néon
11 22.99 Na sodium sodium	12 24.31 Mg magnesium magnésium																	13 26.98 Al aluminum aluminium	14 28.086 Si silicon silicium	15 30.974 P phosphorus phosphore	16 32.07 S sulfur soufre	17 35.453 Cl chlorine chlore	18 39.95 Ar argon argon
19 39.098 K potassium potassium	20 40.08 Ca calcium calcium	21 44.96 Sc scandium scandium	22 47.87 Ti titanium titane	23 50.94 V vanadium vanadium	24 51.996 Cr chromium chrome	25 54.94 Mn manganese manganèse	26 55.85 Fe iron fer	27 58.93 Co cobalt cobalt	28 58.69 Ni nickel nickel	29 63.546 Cu copper cuivre	30 65.39 Zn zinc zinc	31 69.72 Ga gallium gallium	32 72.61 Ge germanium germanium	33 74.922 As arsenic arsenic	34 78.96 Se selenium sélénium	35 79.904 Br bromine brome	36 83.80 Kr krypton krypton						
37 85.468 Rb rubidium rubidium	38 87.62 Sr strontium strontium	39 88.91 Y yttrium yttrium	40 91.22 Zr zirconium zirconium	41 92.91 Nb niobium niobium	42 95.94 Mo molybdenum molybdène	43 98 Tc technetium technétium	44 101.07 Ru ruthenium ruthénium	45 102.91 Rh rhodium rhodium	46 106.42 Pd palladium palladium	47 107.87 Ag silver argent	48 112.411 Cd cadmium cadmium	49 114.82 In indium indium	50 118.71 Sn tin étain	51 121.76 Sb antimony antimoine	52 127.60 Te tellurium tellure	53 126.904 I iodine iode	54 131.29 Xe xenon xénon						
55 132.91 Cs cesium césium	56 137.33 Ba barium baryum	57 138.91 La lanthanum lanthane	72 178.49 Hf hafnium hafnium	73 180.95 Ta tantalum tantale	74 183.84 W tungsten tungstène	75 186.21 Re rhenium rhénium	76 190.21 Os osmium osmium	77 192.22 Ir iridium iridium	78 195.08 Pt platinum platine	79 196.97 Au gold or	80 200.59 Hg mercury mercure	81 204.38 Tl thallium thallium	82 207.2 Pb lead plomb	83 208.98 Bi bismuth bismuth	84 209 Po polonium polonium	85 210 At astatine astate	86 222 Rn radon radon						
87 223 Fr francium francium	88 226.03 Ra radium radium	89 227.03 Ac actinium actinium	104 261 Rf rutherfordium rutherfordium	105 262 Unp unnilpentium unnilpentium	106 266 Unh unnilhexium unnilhexium	107 264 Uns unnilseptium unnilseptium	108 269 Uno unnulloctium unnillennium	109 268 Une unnillennium unnillennium	110 269 Uun ununillium ununillium	111 272 Uuu unununium unununium	112 277 Uub ununbium ununbium												

atomic number
atomic mass
Symbol
English name
French name*

*all are masculine

58 140.12 Ce cerium cérium	59 140.91 Pr praseodymium praseodyme	60 144.24 Nd neodymium néodyme	61 145 Pm promethium prométhium	62 150.36 Sm samarium samarium	63 151.96 Eu europium europium	64 157.25 Gd gadolinium gadolinium	65 158.93 Tb terbium terbium	66 162.50 Dy dysprosium dysprosium	67 164.93 Ho holmium holmium	68 167.26 Er erbium erbium	69 168.93 Tm thulium thulium	70 173.04 Yb ytterbium ytterbium	71 174.97 Lu lutetium lutécium
90 232.038 Th thorium thorium	91 231.036 Pa protactinium protactinium	92 238.029 U uranium uranium	93 237.048 Np neptunium neptunium	94 244 Pu plutonium plutonium	95 243 Am americium américium	96 247 Cm curium curium	97 247 Bk berkelium berkélium	98 251 Cf californium californium	99 252 Es einsteinium einsteinium	100 257 Fm fermium fermium	101 258 Md mendelevium mendélévium	102 259 No nobelium nobélium	103 262 Lr lawrencium lawrencium