Quiz II General Chemistry II Lecture (A) Spring 13 Dr. Hahn 20 pts 2/1 F (9:30) am quiz # _____
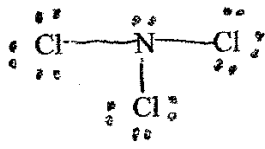
Name _K-ey_ (print) Name _____ (sign)
Please show all work for full credit & to get partial credit. (suggestion: A guess is better than no answer.)

1 From review: (4 pts, 2 pts each)
a. What is the number of valence electrons in the molecule NCl_3 $\underline{26 = 5 + 3(7)}$
b. Which of the following is a correct Lewis Dot structure for the molecule NCl_3 Circle the number of the correct Lewis Dot structure
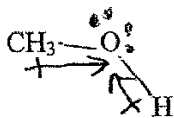
$\rightarrow 13 \times 2 = 26 \bar{e}$

N has more than octet elements up to 2nd row

$Cl = N = Cl$
$|||$
Cl

(1)

$Cl - N - Cl$
$|$
Cl

(2)

$/4 \times 2 = 28 \bar{e}$

expanded octet not allowed

2. Given the following molecule what is the intermolecular force? To answer, complete the following. (3 pts each, 12 pts)

(bent molecule)

$CH_3 - O$
$\diagdown H$

a. Draw in the individual bond dipole vectors on the molecule shown. (vectors look like $+\longrightarrow$)

b. The vector sum of the dipole moment for the molecule is [(zero) or (not zero)] (circle one)

c. The molecule as a whole is [(polar) or (nonpolar)] (circle one)

d. The intermolecular force for the molecule is [(dispersion forces) or (dipolar) or (hydrogen bonding)] (circle one) H attached to F, O, N — (polarity above not factor)
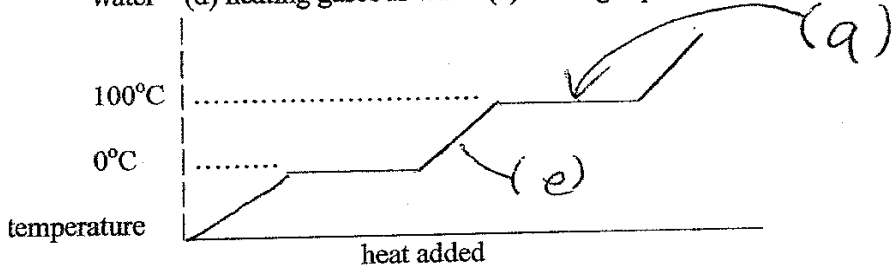
H bonded no matter structure

3. For the following chart for the interconversion of water under Pressure = 1.00 atm, use the following letters to label the blank on the graph. You may use a letter more than once or you may end up not using some letters at all. (a) converting liquid to gas (b) converting solid to liquid (c) heating solid water (d) heating gaseous water (e) heating liquid water (2 pts each, 4 pts)

(a)

100°C ....

0°C ....

(e)

temperature

heat added

Extra Credit: (3 pts) Please show work. What is the heat needed to warm 4.77 grams ice from -35 °C to 0 °C? (q = m C ΔT, C_{ice} = 2.09 J/g°C) (show work on back if you run out of space)

$\Delta T = (0°C + 35°C)$ $m = 4.77 g$

$q = (4.77 g)(2.09 \frac{J}{g °C})(+35 °C) = 350 J$ (2 sig fig)

Quiz II   General Chemistry II   Lecture B   Spring 13   Dr. Hahn   20 pts   2/1 F 9:30 am   quiz # ____

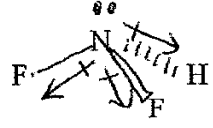Name _____Key_____ (print)   Name _____(sign)

Please show all work for full credit & to get partial credit. (suggestion: A guess is better than no answer.)

H   C   O

1   From review: (4 pts, 2 pts each)
a.   What is the number of valence electrons in the molecule H_2CO $12 = 2(1e) + 4e + 6e$
b.   Which of the following is a correct Lewis Dot structure for the molecule H_2CO Circle the number
   of the correct Lewis Dot structure

$9 \times 2 = 18e$ $6 \times 2 = 12e$

H can only have
duet – $2e^-$

(1) too many e

(2) ✓

2.   Given the following molecule what is the intermolecular force?   To answer, complete the following.
(3 pts each, 12 pts)

electrons left off of F for structural clarity
(tetrahedral at N)

a.   Draw in the individual bond dipole vectors on the molecule shown. (vectors should look like +———▶)

b. The vector sum of the dipole moment for the molecule is [(zero) or (not zero)] (circle one)

c.   The molecule as a whole is [(polar) or (nonpolar)] (circle one)

d.   The intermolecular force is [(dispersion forces) or (dipolar) or (hydrogen bonding)] (circle one)

2.   For the following chart for the interconversion of water under Pressure = 1.00 atm, use the following
letters to label the blank on the graph. You may use a letter more than once or you may end up not
using some letters at all. (a) converting liquid to gas (b) converting solid to liquid (c) heating solid
water   (d) heating gaseous water   (e) heating liquid water   (2 pts each, 4 pts)

(b)

100°C

0°C

(d)

temperature

heat added

Extra Credit: (3 pts) Please show work.   What is the heat needed to melt 7.87 moles ice?
(q = n Δ H$_{fusion}$, ΔH$_{fusion}$ = 6.02 kJ/mol) (show work on back if you run out of space)

$q = (7.87 \text{ moles ice})(6.02 \text{ kJ/mol}) = 47.4 \text{ kJ}$

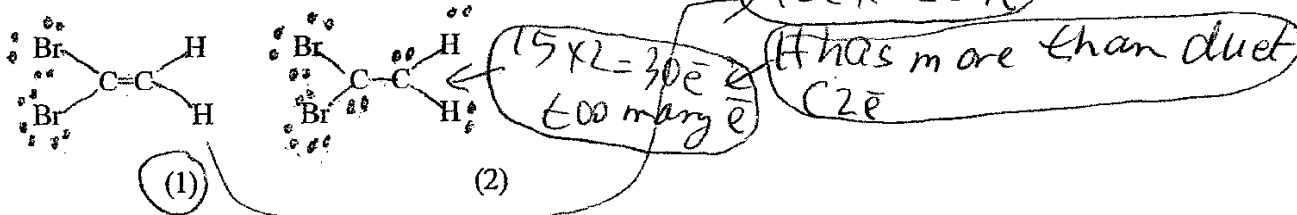Quiz II General Chemistry II Lecture (A) Spring 13 Dr. Hahn 20 pts 2/1 F (11:30 am) quiz # _____

Name ___K e_y___ (print) Name _____(sign)

Please show all work for full credit & to get partial credit. (suggestion: A guess is better than no answer.)

1 From review: (4 pts, 2 pts each)

a. What is the number of valence electrons in the molecule NH_4^+

$$8\,\bar{e} = 5e + 4(1\bar{e}) - 1$$

N   H   charge

b. Which of the following is a correct Lewis Dot structure for the molecule NH_4^+ Circle the number of the correct Lewis Dot structure

$16 \times 2 = 32\bar{e}$

too many $\bar{e}$, H can only have duet - $2\bar{e}$, N cannot have more than $8\bar{e}$ - 2nd period element

$4 \times 2 = 8\bar{e}$

(1)   (2)

2. Given the following molecule what is the intermolecular force? To answer, complete the following.
(12 pts, 3 pts each)

electrons left off F for structural clarity
(trigonal pyramidal at N)

a. Draw in the individual bond dipole vectors on the molecule shown. (vectors look like +—➤)

b. The vector sum of the dipole moment for the molecule is [(zero) or (not zero)] (circle one)

c. The molecule as a whole is [(polar) or (nonpolar)] (circle one)

d. The intermolecular force for the molecule is [(dispersion forces) or (dipolar) or (hydrogen bonding)]
(circle one) for H bonding a, b, c has no effect

3. For the following chart for the interconversion of water under Pressure = 1.00 atm, use the following letters to label the blank on the graph. You may use a letter more than once or you may end up not using some letters at all. (a) converting liquid to gas (b) converting solid to liquid (c) heating solid water (d) heating gaseous water (e) heating liquid water   (4 pts, 2 pts each)

100°C

0°C

temperature

heat added

(e)

(c)
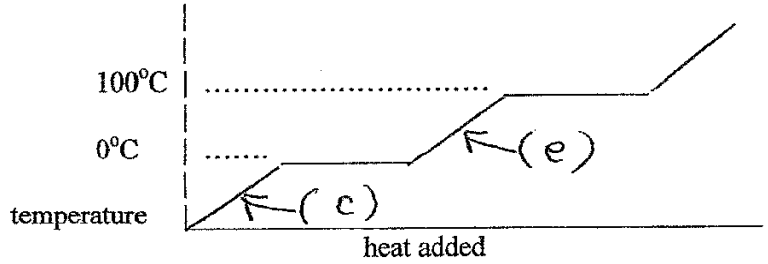
H directly attached to F, O, N

Extra Credit: (3 pts) Please show work. What is the heat needed to warm 32.54 grams of liquid water from 45.1 °C to 100.0 °C ?   (q = m C ΔT, C_{water} = 4.184 J/ g °C) (show work on back if you run out of space)

$$\Delta T = 100.0°C - 45.1°C = 54.9°C$$

$$q = (32.54\,g)\left(\frac{4.184\,J}{g\,°C}\right)(54.9°C) = 7465\,J$$

$$7.47\,kJ$$

Quiz II   General Chemistry II   Lecture B   Spring 13   Dr. Hahn   20 pts   2/1 F   11:30 am   quiz # _____

Name _____Key_____ (print)   Name _____(sign)

Please show all work for full credit & to get partial credit. (suggestion: A guess is better than no answer.)

1   From review: (4 pts, 2 pts each)

a. What is the number of valence electrons in the molecule $C_2Br_2H_2$ $24 = 2(4\bar{e}) + 2(7\bar{e}) + 2(1\bar{e})$

b. Which of the following is a correct Lewis Dot structure for the molecule $C_2Br_2H_2$ Circle the number of the correct Lewis Dot structure

$(12\bar{e} \times 2 = 24\bar{e})$

$(15 \times 2 = 30\bar{e}$
$too\ many\ \bar{e})$

(H has more than duet)
$C2\bar{e}$

(1)   (2)

2. Given the following molecule what is the intermolecular force? To answer, complete the following.
(12 pts, 3 pts each)
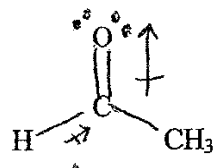
(trigonal planar at C)

a. Draw in the individual bond dipole vectors on the molecule shown. (vectors look like   +—→)

b. The vector sum of the dipole moment for the molecule is [(zero) or (not zero)] (circle one)

c. The molecule as a whole is [(polar) or (nonpolar)] (circle one)

d. The intermolecular force for the molecule is [(dispersion forces) or (dipolar) or (hydrogen bonding)]
(circle one) H not directly attached to F, O, N

3. For the following chart for the interconversion of water under Pressure = 1.00 atm, use the following letters to label the blank on the graph. You may use a letter more than once or you may end up not using some letters at all.   (a) converting liquid to gas (b) converting solid to liquid (c) heating solid water (d) heating gaseous water (e) heating liquid water   (4 pts, 2 pts each)

100°C
0°C
temperature
heat added
(c)
(a)
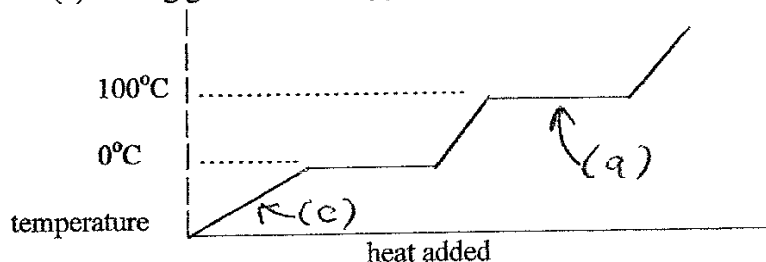
Extra Credit: (3 pts)   Please show work. What is the heat needed to convert 2.65 moles of liquid water to gaseous water? (q = n $\Delta H_{vaporization}$, $\Delta H_{vaporization}$ = 40.7 kJ/mol) (show work on back if you run out of space)

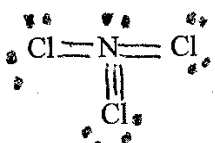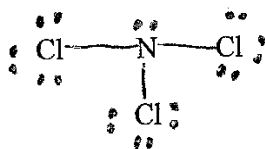$q = (2.65\ moles)(40.7\ \frac{kJ}{mol}) = 108\ kJ$

Name _____(print) Name _____(sign)
Please show all work for full credit & to get partial credit. (suggestion: A guess is better than no answer.)

1 From review: (4 pts, 2 pts each)
a. What is the number of valence electrons in the molecule NCl_3 _____
b. Which of the following is a correct Lewis Dot structure for the molecule NCl_3 Circle the number of
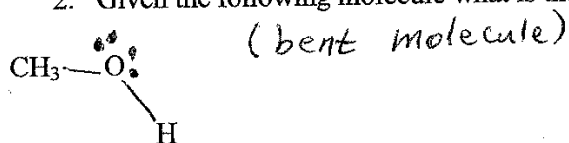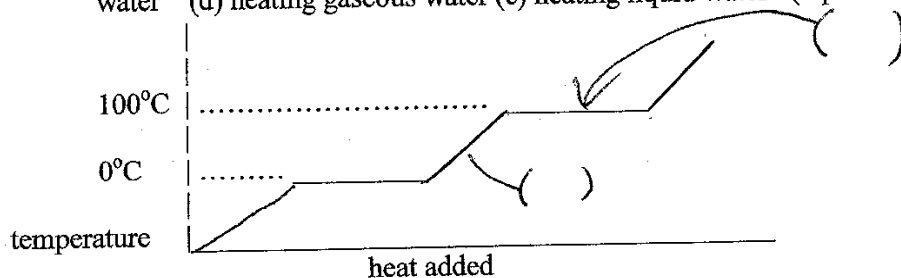   the correct Lewis Dot structure

$Cl = N = Cl$
$|||$
Cl

(1)

$Cl — N — Cl$
$|$
Cl

(2)

2. Given the following molecule what is the intermolecular force?   To answer, complete the following.
    (bent molecule)   (3 pts each, 12 pts)

$CH_3 — O$
        $\backslash$
          H

a. Draw in the individual bond dipole vectors on the molecule shown. (vectors look like +——▶)

b. The vector sum of the dipole moment for the molecule is [(zero) or (not zero)] (circle one)

c. The molecule as a whole is [(polar) or (nonpolar)] (circle one)

d. The intermolecular force for the molecule is [(dispersion forces) or (dipolar) or (hydrogen bonding)]
    (circle one)

3. For the following chart for the interconversion of water under Pressure = 1.00 atm, use the following
    letters to label the blank on the graph. You may use a letter more than once or you may end up not
    using some letters at all. (a) converting liquid to gas (b) converting solid to liquid (c) heating solid
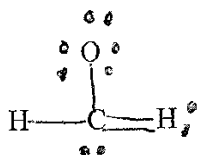   water   (d) heating gaseous water (e) heating liquid water (2 pts each, 4 pts)

100°C |..............................   (   )

0°C |.........

temperature |
                        heat added

Extra Credit: (3 pts) Please show work.   What is the heat needed to warm 4.77 grams ice from -35 °C to 0
°C?   (q = m C ΔT, C_{ice} = 2.09 J/g°C) (show work on back if you run out of space)

Name _____(print) Name _____(sign)
Please show all work for full credit & to get partial credit. (suggestion: A guess is better than no answer.)

1   From review: (4 pts, 2 pts each)
a. What is the number of valence electrons in the molecule H_2CO _____
b. Which of the following is a correct Lewis Dot structure for the molecule H_2CO Circle the number
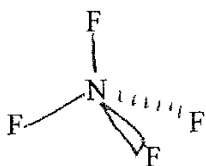   of the correct Lewis Dot structure
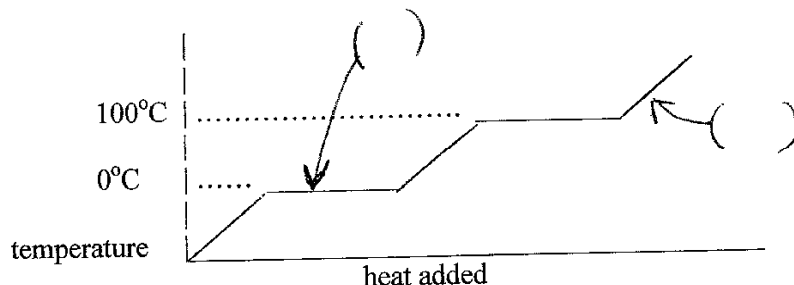
         (1)   (2)

2. Given the following molecule what is the intermolecular force? To answer, complete the following.
(3 pts each, 12 pts)

electrons left off of F for structural clarity
(tetrahedral at N)

a. Draw in the individual bond dipole vectors on the molecule shown. (vectors should look like   +—➤)

b. The vector sum of the dipole moment for the molecule is [(zero) or (not zero)] (circle one)

c. The molecule as a whole is [(polar) or (nonpolar)] (circle one)

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2. For the following chart for the interconversion of water under Pressure = 1.00 atm, use the following
    letters to label the blank on the graph. You may use a letter more than once or you may end up not
    using some letters at all. (a) converting liquid to gas (b) converting solid to liquid (c) heating solid
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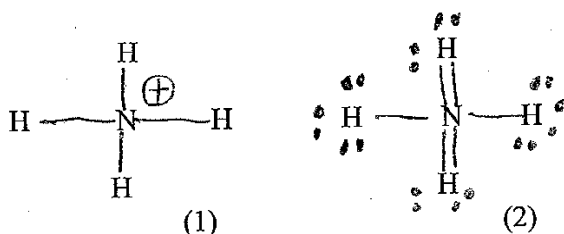
```
              (   )
        |     /  \
100°C   |....../........._____/\_( )
        |     /        /
  0°C   |....../_____/
        |    ▼
temperature |/_____
              heat added
```

Extra Credit: (3 pts) Please show work.   What is the heat needed to melt 7.87 moles ice?
$(q = n \Delta H_{fusion}, \Delta H_{fusion} = 6.02 \text{ kJ/mol})$ (show work on back if you run out of space)

Name _____(print) Name _____(sign)
Please show all work for full credit & to get partial credit. (suggestion: A guess is better than no answer.)

1 From review: (4 pts, 2 pts each)
a. What is the number of valence electrons in the molecule NH_4^+ _____
b. Which of the following is a correct Lewis Dot structure for the molecule NH_4^+ Circle the number of
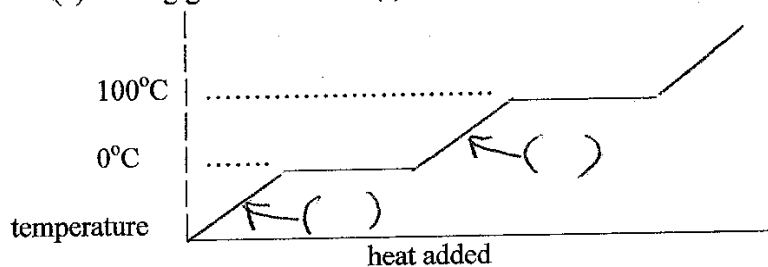   the correct Lewis Dot structure

        (1)   (2)

2. Given the following molecule what is the intermolecular force?   To answer, complete the following.
                                                    (12 pts, 3 pts each)

                        electrons left off F for structural clarity
                        (trigonal pyramidal at N)

    a. Draw in the individual bond dipole vectors on the molecule shown. (vectors look like +——▶)

    b. The vector sum of the dipole moment for the molecule is [(zero) or (not zero)] (circle one)

    c. The molecule as a whole is [(polar) or (nonpolar)] (circle one)

    d. The intermolecular force for the molecule is [(dispersion forces) or (dipolar) or (hydrogen bonding)]
        (circle one)

3. For the following chart for the interconversion of water under Pressure = 1.00 atm, use the following
    letters to label the blank on the graph.   You may use a letter more than once or you may end up not using
    some letters at all.   (a) converting liquid to gas (b) converting solid to liquid (c) heating solid water
    (d) heating gaseous water (e) heating liquid water (4 pts, 2 pts each)
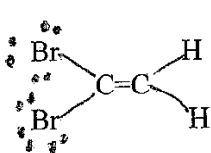

Extra Credit: (3 pts) Please show work. What is the heat needed to warm 32.54 grams of liquid water from
45.1 °C to 100.0 °C ?   (q = m C ΔT, C_{water} = 4.184 J/ g °C) (show work on back if you run out of space)
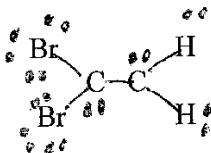
Name _____(print) Name _____(sign)

Please show all work for full credit & to get partial credit. (suggestion: A guess is better than no answer.)

1   From review: (4 pts, 2 pts each)

a. What is the number of valence electrons in the molecule $C_2Br_2H_2$ _____

b. Which of the following is a correct Lewis Dot structure for the molecule $C_2Br_2H_2$ Circle the number
    of the correct Lewis Dot structure

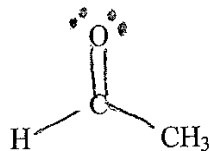   (1)   (2)
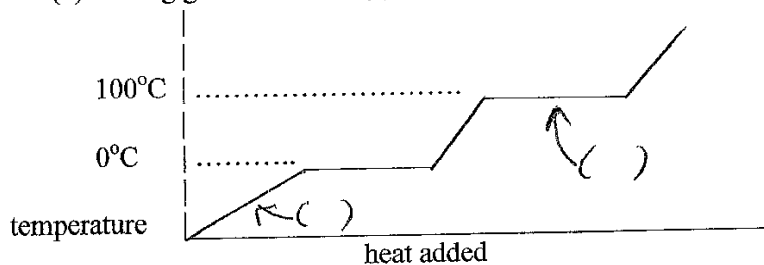
2. Given the following molecule what is the intermolecular force?   To answer, complete the following.
                                        (12 pts, 3 pts each)

                                        (trigonal planar at C)

a.   Draw in the individual bond dipole vectors on the molecule shown. (vectors look like   +—➤)

b.   The vector sum of the dipole moment for the molecule is [(zero) or (not zero)] (circle one)

c.   The molecule as a whole is [(polar) or (nonpolar)] (circle one)

d.   The intermolecular force for the molecule is [(dispersion forces) or (dipolar) or (hydrogen bonding)]
     (circle one)

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    some letters at all. (a) converting liquid to gas (b) converting solid to liquid (c) heating solid water
    (d) heating gaseous water (e) heating liquid water   (4 pts, 2 pts each)

Extra Credit: (3 pts)   Please show work. What is the heat needed to convert 2.65 moles of liquid water to
gaseous water? ($q = n \Delta H_{vaporization}$, $\Delta H_{vaporization}$ = 40.7 kJ/mol) (show work on back if you run out of space)