Mark answers on your scantron for Questions 1-29. Mark only one answer unless directed otherwise. Each question is worth 2 pt.

Chp 7.1 – Types of Attractive Forces

1. All of the following bonds are found in organic compounds. Which of these is the LEAST polar?

     A) C=C   B) C-H   C) C-Cl   D) C=O   E) O-H

2. When it comes to hydrogen bonding which chemical bond in Question 1 has a hydrogen bond DONAR?

3. In the following molecules, which of the following has the dipole correctly indicated?
   Use the electronegativities shown above to help you answer this question.

   A) CH_3-CH-CH_3 B) CH_3-CH_3 C)   O   D)   Cl-H   E) All are correct

 ||
         O-H   H-C-H

4. Which compound in Question 3 has only London forces?

5. What is the name of the interaction (the attractive force) that occurs between water and sodium chloride?

   A) London   B) Dipole-dipole   C) Hydrogen bonding   D) Ion-dipole   E) Ion-ion

6. Remember the lab where you made Jiggle Jelly. Which of the attractive forces in Question 5 was mostly responsible for the formation of the Jiggle Jelly?

(7 pt) Draw all the hydrogen bonds possible between water and isopropyl alcohol. Mark the donar and the acceptor atoms in your diagram. CH_3-CH-CH_3
                                           |
                                        OH
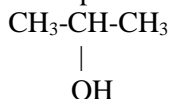
Chp 7.2 - Liquids and Solids: Attractive Forces Everywhere

7. The transition from the gas phase to the liquid phase is called:

A) condensation   B) freezing   C) sublimation   D) deposition   E) melting

8. The appearance of water dripping off a snow covered roof on a warm Spring day is represented by _____ in this diagram.

For each of the following pairs of compound indicate which has the higher boiling point.

9.   A) $CH_3CH_2CH_3$ B) $CH_3(CH_2)_3CH_3$

10.   A) [ ]   B) $CH_3(CH_2)_2CH_3$

Chp 7.3 Attractive Forces and Solubility

11. Soaps can be described as:
   A) esters of fatty acids   B) salts of fatty acids   C) long chain acids   D) all of these

12. The long hydrocarbon tails of soap molecules are:
   A) hydrophobic and attracted to water
   B) hydrophobic and attracted to oils
   C) hydrophilic and attracted to water
   D) hydrophilic and attracted to oils

13. Remember the golden rule "like dissolves like"? Which of the following compounds will dissolve in water? *Mark all that apply on your scantron.*

   A) CH_3-CH-CH_3 B) CH_3-CH_3 C)   O   D)   Cl-H   E)   All are correct
              | ||
            O-H   H-C-H

14. The compound formed from the condensation reaction between a glycerol molecule and 3 fatty acid molecules contains the following functional group.
   A) Alcohol   B) aldehyde   C) carboxylic acid   D) Ester   E) Ether

14 pt

(9 pt) Write the condensation reaction between glycerol and 3 stearic acid molecules.

(4 pt) Base hydrolysis

CH$_2$-O-C-(CH$_2$)$_7$ CH$_2$ CH$_2$ CH$_3$
| || \   / \   / \ /
| O   CH=CH CH=CH   CH$_2$
| 3NaOH / H$_2$O
CH-O-C-(CH$_2$)$_8$CH$_3$ $\longrightarrow$
| ||
| O
|
CH$_2$-O-C-(CH$_2$)$_8$CH$_3$
        ||
         O

(6 pt) Acid hydrolysis

CH$_2$-O-C-(CH$_2$)$_{14}$CH$_3$
| ||
| O
| HCl / 3H$_2$O
CH-O-C(CH$_2$)$_7$ (CH$_2$)$_7$CH$_3$ $\longrightarrow$
| || \   /
| O   CH=CH
|
CH$_2$-O-C-(CH$_2$)$_{14}$CH$_3$
        ||
         O

(6 pt) Explain why soap molecules form micelles in water. Include the kind of intermolecular force that occurs between water and soap.

25 pt

(8 pt) Draw a diagram showing the hydrated ions when sodium chloride dissolves in water.

7.4 Gases: Attractive Forces are Limited

(6 pt) Describe how Boyles Law explains how inhalation and exhalation occurs.

15. A 65 mL sample of argon gas has a temperature of 325 °C. What will the temperature be in °C when the volume of the gas is decreased to 25 mL at constant pressure?

A) 65 °C   B) 125 °C   C) -43 °C   D) 1280 °C   E) 641 °C   AA) 325 °C

(6 pt) A gas has a volume of 460 mL at 500 mm Hg. What will be the volume at 1.2 atm? *Show all work and round answer to the correct number of significant figures.*

(6 pt) A gas has a volume of 10L at 32 °F. What is the final temperature of the gas (in °C) if its volume increased to 25 L? *Show all work and round answer to the correct number of significant figures.*

28 pt

Chp 7.5 Dietary Lipids and Trans Fats

16. Oils are generally _____ at room temperature and are obtained from _____.

   A) solids; animals   B) liquids; plants   C) solids; plants   D) liquids; animals

(6 pt) Hydrogenation

CH₂-O-C-(CH₂)₇   (CH₂)₇-CH₃
   | ‖   \   /
   | O   CH=CH
   | 2H₂ / catalyst
CH-O-C-(CH₂)₇   (CH₂)₇-CH₃   ————————————→
   | ‖   \   /
   | O   CH=CH
   |
CH₂-O-C-(CH₂)₇   (CH₂)₇-CH₃
   | ‖   \   /
   | O   CH=CH

(4 pt) A client is ordered 10. mg of Codeine phosphate by subcutaneous injection. 50. mg in 1.0 mL of liquid for SC
Injection is available. How many mL will you administer?

7.6 Membranes and lipoproteins.

17. The figure on the right represents what kind of molecule?

   A) Monosaccharide   B) Triglyceride   C) Phospholipid   D) Protein

18. The region labeled "I" is the

   A) Nucleus   B) Polar head   C) Non-polar tail   D) Fatty acid   E) Alcohol

19. The region labeled "II" is the

   A) Nucleus   B) Polar head   C) Non-polar tail   D) Fatty acid   E) Alcohol

20. Which of the following describes the type of molecule shown in the figure?

   A) These are known as amphipathic molecules.
   B) These form lipid bilayer membranes in cells.
   C) These form a biochemical assembly called a serum lipoprotein.
   D) All of the above are correct.

21. Which of the following describes a lipid bilayer membrane?

   A) The surface is hydrophobic
   B) The interior is hydrophobic
   C) Sodium chloride is a likely component
   D) Triglycerides are found in the interior
   E) It is rigid and inflexible

22 pt

22. In a lipid bilayer membrane:
    A) The hydrophilic heads of the molecules are on the outer and inner surface.
    B) All the molecules are triglycerides
    C) The hydrophobic heads point to the hydrophilic tails
    D) The hydrophobic tails are on the inner and outer surface.

Use the following to answer Questions 23-25

23. Which of the following when embedded in a membrane, makes it less flexible?

24. This lipid is used to store fatty acids in humans.

25. Sex hormones belong to this class of lipid.

]

A) cholesterol

B) carbohydrate

C) triglyceride

D) phospholipid

E) steroid

AB) protein

Use the following to answer questions 26-28:
 A. chylomicrons;   B. VLDL;   C. LDL;   D. HDL

26. Which is the smallest lipoprotein?

27. Which lipoprotein is least dense?

28. Which lipoprotein has the highest cholesterol content?

29. Which lipoprotein is known as the "good cholesterol"?

16 pt

PERIODIC CHART OF THE ELEMENTS

1 **H** 1.00797																	1 **H** 1.00797
3 **Li** 6.939	4 **Be** 9.0122											5 **B** 10.811	6 **C** 12.0112	7 **N** 14.0067	8 **O** 15.9994	9 **F** 18.9984	2 **He** 4.0026 / 10 **Ne** 20.183

Main table:

1 H 1.00797																	1 H 1.00797 / 2 He 4.0026
3 Li 6.939	4 Be 9.0122											5 B 10.811	6 C 12.0112	7 N 14.0067	8 O 15.9994	9 F 18.9984	10 Ne 20.183
11 Na 22.9898	12 Mg 24.312											13 Al 26.9815	14 Si 28.086	15 P 30.9738	16 S 32.064	17 Cl 35.453	18 Ar 39.948
19 K 39.102	20 Ca 40.08	21 Sc 44.956	22 Ti 47.90	23 V 50.942	24 Cr 51.996	25 Mn 54.9380	26 Fe 55.847	27 Co 58.9332	28 Ni 58.71	29 Cu 63.54	30 Zn 65.37	31 Ga 69.72	32 Ge 72.59	33 As 74.9216	34 Se 78.96	35 Br 79.909	36 Kr 83.80
37 Rb 85.47	38 Sr 87.62	39 Y 88.905	40 Zr 91.22	41 Nb 92.906	42 Mo 95.94	43 Tc (99)	44 Ru 101.07	45 Rh 102.905	46 Pd 106.4	47 Ag 107.870	48 Cd 112.40	49 In 114.82	50 Sn 118.69	51 Sb 121.75	52 Te 127.60	53 I 126.904	54 Xe 131.30
55 Cs 132.905	56 Ba 137.34	*57 La 138.91	72 Hf 178.49	73 Ta 180.948	74 W 183.85	75 Re 186.2	76 Os 190.2	77 Ir 192.2	78 Pt 195.09	79 Au 196.967	80 Hg 200.59	81 Tl 204.37	82 Pb 207.19	83 Bi 208.980	84 Po (210)	85 At (210)	86 Rn (222)
87 Fr (223)	88 Ra (226)	‡89 Ac (227)	104 Rf (261)	105 Db (262)	106 Sg (266)	107 Bh (262)	108 Hs (265)	109 Mt (266)	110 ? (271)	111 ? (272)	112 ? (277)						

✳ Lanthanide Series

58 Ce 140.12	59 Pr 140.907	60 Nd 144.24	61 Pm (147)	62 Sm 150.35	63 Eu 151.96	64 Gd 157.25	65 Tb 158.924	66 Dy 162.50	67 Ho 164.930	68 Er 167.26	69 Tm 168.934	70 Yb 173.04	71 Lu 174.97

‡ Actinide Series

90 Th 232.038	91 Pa (231)	92 U 238.03	93 Np (237)	94 Pu (242)	95 Am (243)	96 Cm (247)	97 Bk (247)	98 Cf (249)	99 Es (254)	100 Fm (253)	101 Md (256)	102 No (256)	103 Lr (257)

Periodic Table with Electronegativities:

1A	2A	3B	4B	5B	6B	7B		8B		1B	2B	3A	4A	5A	6A	7A	8A
1 H 2.1 1.01																	2 He 4.00
3 Li 1.0 6.94	4 Be 1.5 9.01				at. no. / Symbol / *e.n.* / **amu**							5 B 2.0 10.81	6 C 2.5 12.01	7 N 3.0 14.00	8 O 3.5 16.00	9 F 4.0 19.00	10 Ne 20.18
11 Na 0.9 23.00	12 Mg 1.2 24.31											13 Al 1.5 26.98	14 Si 1.8 28.09	15 P 2.1 30.97	16 S 2.5 32.06	17 Cl 3.0 35.45	18 Ar 39.95
19 K 0.8 39.10	20 Ca 1.0 40.08	21 Sc 1.3 44.96	22 Ti 1.5 47.90	23 V 1.6 50.94	24 Cr 1.6 52.00	25 Mn 1.5 54.94	26 Fe 1.8 55.85	27 Co 1.9 58.93	28 Ni 1.9 58.71	29 Cu 1.9 63.54	30 Zn 1.6 65.37	31 Ga 1.6 69.72	32 Ge 1.8 72.59	33 As 2.0 74.92	34 Se 2.4 78.96	35 Br 2.8 79.91	36 Kr 3.0 83.80
37 Rb 0.8 85.47	38 Sr 1.0 87.62	39 Y 1.2 88.90	40 Zr 1.4 91.22	41 Nb 1.6 92.91	42 Mo 1.8 95.94	43 Tc 1.9 (99)	44 Ru 2.2 101.1	45 Rh 2.2 102.9	46 Pd 2.2 106.4	47 Ag 1.9 107.9	48 Cd 1.7 112.4	49 In 1.7 114.8	50 Sn 1.8 118.7	51 Sb 1.9 121.8	52 Te 2.1 127.6	53 I 2.5 126.9	54 Xe 2.6 131.3
55 Cs 0.7 132.9	56 Ba 0.9 137.3	57 La 1.1 138.9	72 Hf 1.3 178.5	73 Ta 1.5 180.9	74 W 1.7 183.8	75 Re 1.9 186.2	76 Os 2.2 190.2	77 Ir 2.2 192.2	78 Pt 2.2 195.1	79 Au 2.4 197.0	80 Hg 1.9 200.6	81 Tl 1.8 204.4	82 Pb 1.9 207.2	83 Bi 1.9 209.0	84 Po 2.0 (210)	85 At 2.2 (210)	86 Rn 2.4 (222)
87 Fr 0.7 (223)	88 Ra 0.9 (226)	89 Ac 1.1 (227)	104 Rf (261)	105 Ha Db (262)	106 Sg (266)	107 Ns Bh (262)	108 Hs (265)	109 Mt (266)	110 Uun (271)	111 Uuu (272)	112 Uub (277)						

58 Ce 1.1 140.1	59 Pr 1.1 140.9	60 Nd 1.1 144.2	61 Pm 1.2 (147)	62 Sm 1.1 150.4	63 Eu 1.2 152.0	64 Gd 1.2 157.2	65 Tb 1.2 158.9	66 Dy 1.2 162.5	67 Ho 1.2 164.9	68 Er 1.2 167.3	69 Tm 1.2 168.9	70 Yb 1.2 173.0	71 Lu 1.3 175.0
90 Th 1.3 232.0	91 Pa 1.5 (231)	92 U 1.7 238.0	93 Np 1.3 (237)	94 Pu 1.3 (242)	95 Am 1.3 (243)	96 Cm 1.3 (247)	97 Bk 1.3 (247)	98 Cf 1.3 (249)	99 Es 1.3 (254)	100 Fm 1.3 (253)	101 Md 1.3 (256)	102 No 1.5 (256)	103 Lr (257)

USEFUL CONVERSION FACTORS AND RELATIONSHIPS

Length

SI unit: meter (m)

$1 \text{ km} = 0.62137 \text{ mi}$

$1 \text{ mi} = 5280 \text{ ft}$

$= 1.6093 \text{ km}$

$1 \text{ m} = 1.0936 \text{ yd}$

$1 \text{ in.} = 2.54 \text{ cm (exactly)}$

$1 \text{ cm} = 0.39370 \text{ in.}$

$1 \text{ Å} = 10^{-10} \text{ m}$

Mass

SI unit: kilogram (kg)

$1 \text{ kg} = 2.2046 \text{ lb}$

$1 \text{ lb} = 453.59 \text{ g}$

$= 16 \text{ oz}$

$1 \text{ amu} = 1.6605402 \times 10^{-24} \text{ g}$

Temperature

SI unit: Kelvin (K)

$0 \text{ K} = -273.15°C$

$= -459.67°F$

$\text{K} = °C + 273.15$

$°C = \frac{5}{9} (°F - 32°)$

$°F = \frac{9}{5} °C + 32°$

Heat = mass x ΔT x specific heat

Energy (derived)

SI unit: Joule (J)

$1 \text{ J} = 1 \text{ kg-m}^2/s^2$

$1 \text{ J} = 0.2390 \text{ cal}$

$= 1 \text{ C} \times 1 \text{ V}$

$1 \text{ cal} = 4.184 \text{ J}$

$1 \text{ eV} = 1.602 \times 10^{-19} \text{ J}$

Pressure (derived)

SI unit: Pascal (Pa)

$1 \text{ Pa} = 1 \text{ N/m}^2$

$= 1 \text{ kg/m-s}^2$

$1 \text{ atm} = 101,325 \text{ Pa}$

$= 760 \text{ torr}$

$= 14.70 \text{ lb/in}^2$

$1 \text{ bar} = 10^5 \text{ Pa}$

Volume (derived)

SI unit: cubic meter (m^3)

$1 \text{ L} = 10^{-3} \text{ m}^3$

$= 1 \text{ dm}^3$

$= 10^3 \text{ cm}^3$

$= 1.0567 \text{ qt}$

$1 \text{ gal} = 4 \text{ qt}$

$= 3.7854 \text{ L}$

$1 \text{ cm}^3 = 1 \text{ mL}$

$1 \text{ in}^3 = 16.4 \text{ cm}^3$

GAS LAWS

$$\frac{P_1 V_1}{T_1} = \frac{P_2 V_2}{T_2}$$

$$\frac{V_1}{n_1} = \frac{V_2}{n_2}$$

$22.4 \text{ L} = 1 \text{ mol @ STP}$

$$P_1 V_1 = P_2 V_2$$

$$\frac{V_1}{T_1} = \frac{V_2}{T_2}$$

$$\frac{P_1}{T_1} = \frac{P_2}{T_2}$$