Chem 51, Spring 2015 Name_____
Exam 7 (Chp 7) 115 pt

Use your scantron to answer questions 1-34. Some Questions may have more than one answer.
Write answers to the questions without numbers directly on the exam.

Section: 7-1 *Types of Attractive Forces*

1) For a series of small molecules of comparable molecular weight, which one of the following choices lists the intermolecular forces in the correct increasing order?
A) London forces < dipole-dipole forces < hydrogen bonds
B) hydrogen bonds < dipole-dipole forces < London forces
C) dipole-dipole forces < hydrogen bonds < London forces
D) London forces < hydrogen bonds < dipole-dipole forces

2) London dispersion forces attractions between molecules depends on what two factors?
A) Molar mass and shape
B) Vapor pressure and size
C) Molar mass and volatility
D) Volatility and shape

3) Which of the following statements about intermolecular forces is true?
A) London dispersions forces are the strongest of the three types.
B) They occur within molecules rather than between the molecules.
C) Hydrogen bonding occurs between any two molecules that contain hydrogen atoms.
D) Dipole-dipole interactions occurs between two polar molecules.

4) When NaCl dissolves in water, the force of attraction that exists between Na^+ and H_2O is called:
A) dipole-dipole B) ion-ion C) hydrogen bonding D) ion-dipole

5) _____ attractions are the only ones that all molecules have regardless of what they are composed of.
A) Dipole-dipole attractions
B) Hydrogen bonding
C) London dispersion forces
D) Ion-ion interactions

6) Which of the following compounds cannot exhibit hydrogen bonding?
A) H_2O B) NH_3 C) HF D) CH_4

7) Which one of these molecules can act as a hydrogen bond acceptor but not a donor?
A) CH_3-O-CH_3 B) C_2H_5OH C) CH_3NH_2 D) CH_3CO_2H

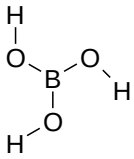
8) How many hydrogen bonds can CH_3-O-CH_2OH form with water?
A) 3 B) 4 C) 5 D) 6

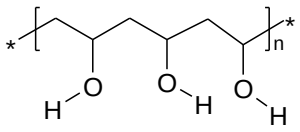
9) The predominant intermolecular force in $(CH_3)_2NH$ is:
A) London-dispersion forces
B) ion-dipole attractions
C) hydrogen bonding
D) dipole-dipole attractions

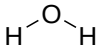
18 pt

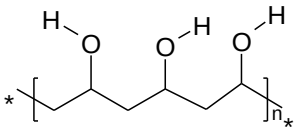
10) Which of the following pairs of compounds contain the same intermolecular forces?
A) CH_3CH_3 and H_2O
B) CH_3CH_2OH and H_2O
C) H_2S and CH_4
D) NH_3 and CH_4

(10 pt) Polyvinyl alcohol (PVA) mixes with water to produce a milky solution. When boric acid is added and mixed, the solution turns to jelly. Explain what happens and draw a diagram showing this using the following structures for PVA, boric acid and water showing the attractive forces that occur. Label a pair of "donar" and "acceptor" atoms.





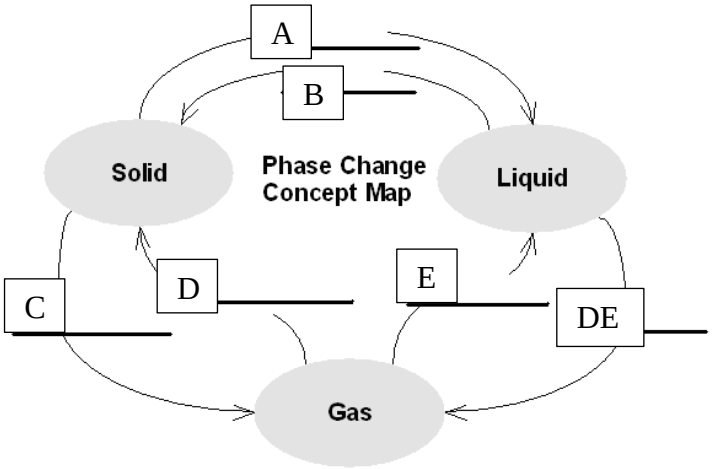




Section: 7-2 *Liquids and Solids: Attractive Forces Are Everywhere*

11) The transition from the gas phase directly to the solid phase is called:
A) condensation B) freezing C) sublimation D) deposition

12) The slow disappearance of ice on the sidewalk during winter is represented by _____in this diagram.



13) Which of these alkanes has the lowest boiling point?
A) C_2H_6 B) C_4H_{10} C) C_6H_{14} D) C_8H_{18}

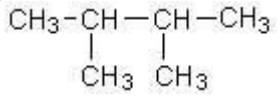
14) Which of the following compounds will have the lowest boiling point?
A) CH_3CH_2OH B) NH_3 C) $CHCl_3$ D) CH_4

20 pt

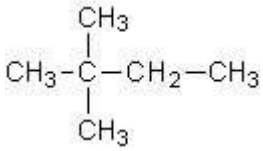
15) Which of the following alkanes has the highest boiling point?

A) $CH_3CH_2CH_2CH_2CH_2CH_3$

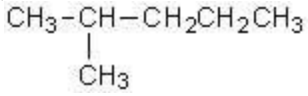
B)



C)



D)

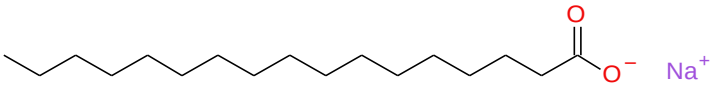


E)

Section: 7-3 *Attractive Forces and Solubility*

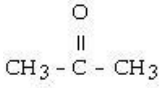
16) The long hydrocarbon tails of soap molecules are:
A) hydrophilic and attracted to water
B) hydrophobic and attracted to water
C) hydrophobic and attracted to oils
D) hydrophilic and attracted to oils

17) Which of the following describes this type of compound?



A) Emulsifier B) soap C) surfactant D) detergent E) amphiphatic AB) all of these

Which of the following compounds would be soluble in the substances listed in the answers?

	STRUCTURE	ANSWERS
18)		A) Water soluble
19)	$CH_3CH_2CH_2CH_3$	B) Fat soluble
20)	NH_4Cl	C) Soluble in both fat and water
21)	$CH_3CH_2CH_2OH$	D) Insoluble in fat and water.

Section: 7-4 *Gases: Attractive Forces Are Limited*

22). Which of the following is/are characteristics of gases?
A) high compressibility
B) relatively long distances between molecules
C) formation of homogeneous mixtures
D) all of the above
E) none of the above

16 pt

23) What is the pressure of nitrogen in atmospheres of a sample that is at 745 mmHg?
A) 1.02 atm B) 0.980 atm C) 0.750 atm D) 1.50 atm

(6 pt) A gas has a volume of 460 mL at 500 mm Hg. What will be the volume at 912 mm?

(6 pt) A gas has a volume of 10L at 32 ^{o}F. What is the final temperature of the gas (in ^{o}C) if its volume increased to 25 L?

Section: 7-5 *Dietary Lipids and Trans Fats*

24) Oils are generally _____ at room temperature and are obtained from _____.
A) solids; animals B) liquids; plants C) solids; plants D) liquids; animal

25) What chemical process is used to convert oils into fats and semi-solids?
A) Hydration B) Hydrogenation C) Saponification D) Esterification

26) If this reaction does not go to completion (partial hydrogenation) then

+ H_2 / cat →

A) A trans fatty acid is produced.
B) A saturated fatty acid (stearic) is produced.
C) Soap is produced.
D) Nothing happens, linolenic acid remains.
E) Partial hydrolysis occurs.

(4 pt) Complete this reaction

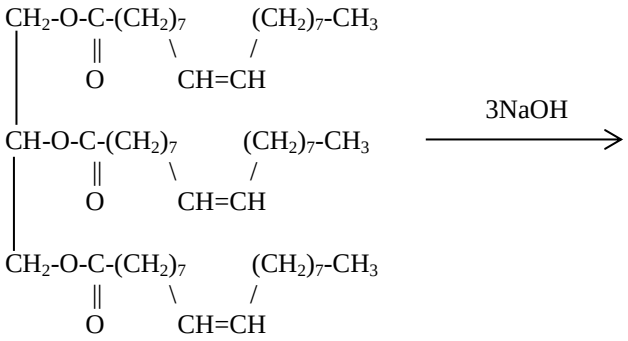
+ $2H_2$ / cat →

24 pt

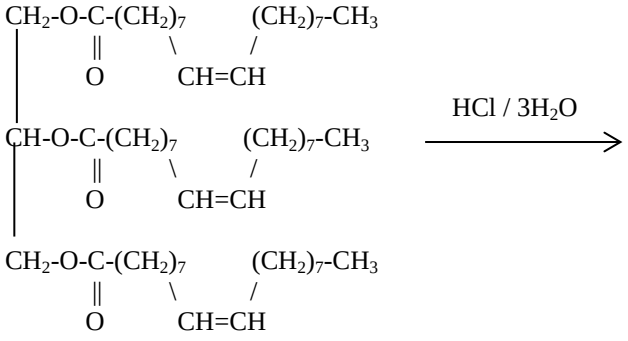
(10 pt) Write the triglyceride that results from the condensation reaction of glycerol and oleic acid.

What veggie oil is this found in?_____

(7 pt) Base hydrolysis



(7 pt) Acid hydrolysis



24 pt

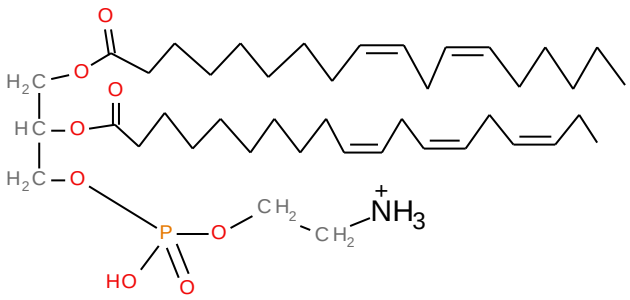
Section: 7-6 *Attractive Forces and the Cell Membrane*

27) In the fluid-mosaic model that explain structure of plasma membranes,
A) There are three layers of glycerophospholipid molecules.
B) Two layers of glycerlphospholipid molecules have their nonpolar sections oriented to the inside of the membrane.
C) Two layers of glycerophospholipid molecules have their nonpolar sections along the outer surface of the membrane.
D) A single row of glycerophospholipid molecules forms a barrier between the inside and outside of the cell.
E) Two layers of proteins separate the contents inside a cell from the surrounding fluids.

28) In a lipid bilayer:
A) the hydrophilic heads of the molecules point towards each other
B) all the molecules are triglycerides
C) the hydrophobic heads point to the hydrophilic tails
D) the hydrophobic tails of the molecules point toward each other

Consider the lipid structure shown at the right.
(4 pt) Circle and identify the hydrophilic and hydrophobic parts of this lipid.

(2 pt)What is the major function of this lipid?



Use the following to answer Questions 14-20

29) Which of the following when embedded in a membrane, makes it less flexible?

30) Which of the lipids is the most polar?

31) Sex hormones belong to this class of lipid.

32) This lipid is used to store fatty acids in humans.

33) Lecithin is this kind of lipid.

34) Which of these lipids contains only one ester bond?

A) cholesterol

B) carbohydrate

C) triglyceride

D) phospholipid

E) steroid

AB) protein

AC) nucleic acid

AD) fatty acid

DE) No answer is correct.

20 pt

PERIODIC CHART OF THE ELEMENTS

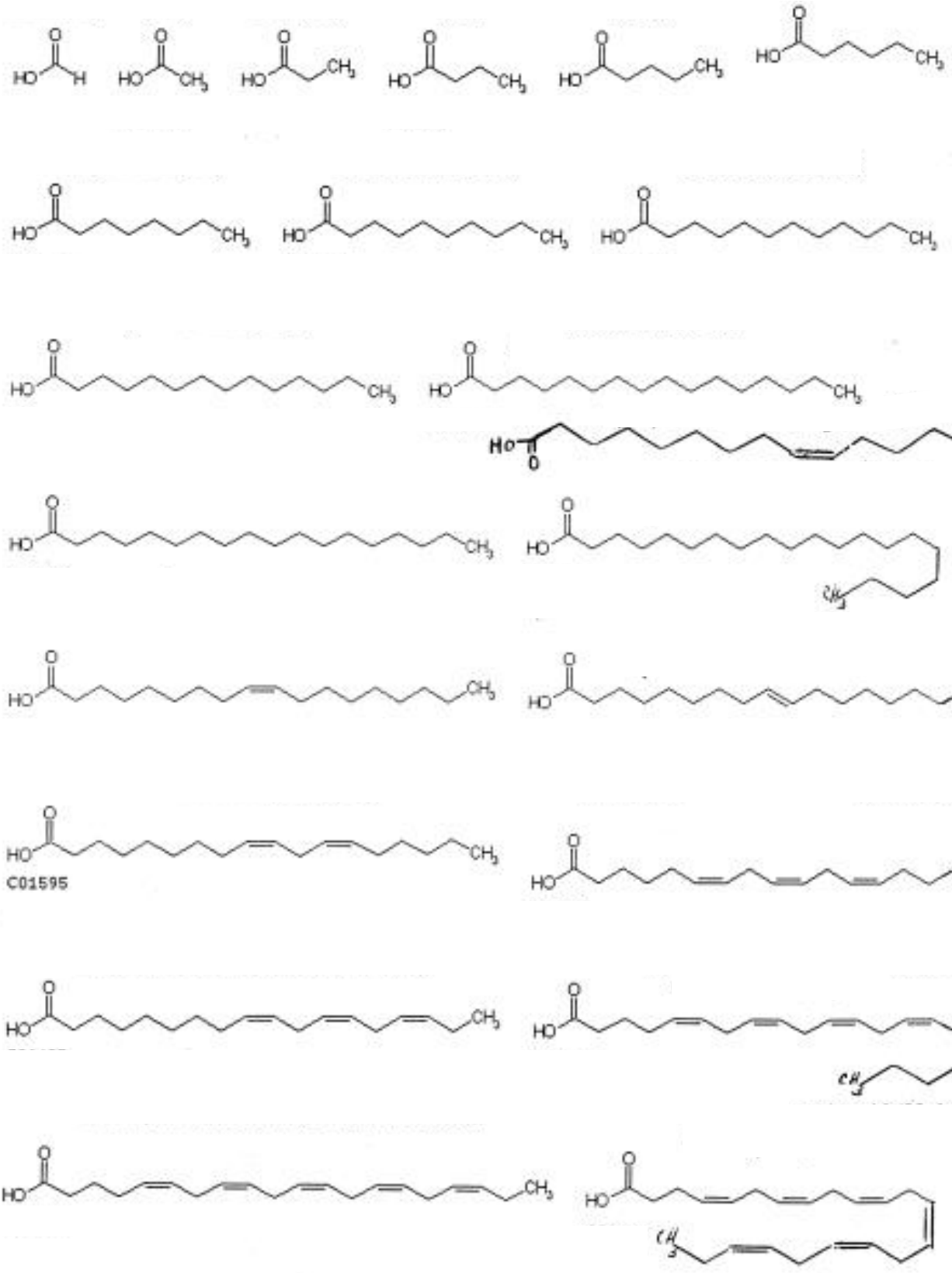
1 H 1.00797																1 H 1.00797	2 He 4.0026
3 Li 6.939	4 Be 9.0122											5 B 10.811	6 C 12.0112	7 N 14.0067	8 O 15.9994	9 F 18.9984	10 Ne 20.183
11 Na 22.9898	12 Mg 24.312											13 Al 26.9815	14 Si 28.086	15 P 30.9738	16 S 32.064	17 Cl 35.453	18 Ar 39.948
19 K 39.102	20 Ca 40.08	21 Sc 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)						

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**											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)**						

at. no.
Symbol
e.n.
amu

Fatty acids



C01595

USEFUL CONVERSION FACTORS AND RELATIONSHIPS

Length

SI unit: meter (m)

1 km = 0.62137 mi
1 mi = 5280 ft
= 1.6093 km
1 m = 1.0936 yd
1 in. = 2.54 cm (exactly)
1 cm = 0.39370 in.
1 Å = 10^{-10} m

Mass

SI unit: kilogram (kg)

1 kg = 2.2046 lb
1 lb = 453.59 g
= 16 oz
1 amu = 1.6605402 x 10^{-24} g

Temperature

SI unit: Kelvin (K)

0 K = −273.15°C
= −459.67°F
K = °C + 273.15
$°C = \frac{5}{9}$ (°F − 32°)
$°F = \frac{9}{5}$ °C + 32°

Energy (derived)

SI unit: Joule (J)

1 J = 1 kg-m^2/s^2
1 J = 0.2390 cal
= 1 C x 1 V
1 cal = 4.184 J
1 eV = 1.602×10^{-19} J

Pressure (derived)

SI unit: Pascal (Pa)

1 Pa = 1 N/m^2
= 1 kg/m-s^2
1 atm = 101,325 Pa
= 760 torr
= 14.70 lb/in^2
1 bar = 10^5 Pa

Volume (derived)

SI unit: cubic meter (m^3)

1 L = 10^{-3} m^3
= 1 dm^3
= 10^3 cm^3
= 1.0567 qt
1 gal = 4 qt
= 3.7854 L
1 cm^3 = 1 mL
1 in^3 = 16.4 cm^3