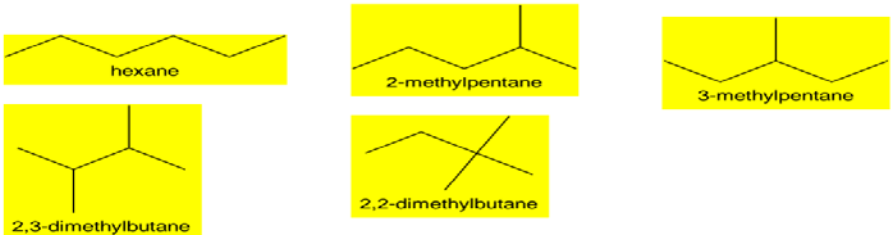
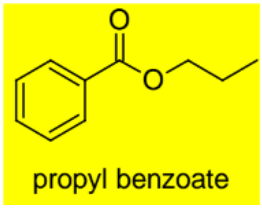
Polytechnic Tutoring Center

Midterm I REVIEW ANSWER KEY – CM 1023, Spring 2021

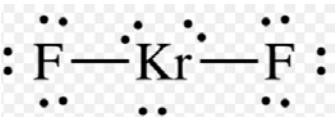
Disclaimer: This mock exam is only for practice. It was made by tutors in the Polytechnic Tutoring Center and is not representative of the actual exam given by the Academic Department.

Multiple-Choice Problems:

1. Bond Order: 1.5 and paramagnetic
2. a)Aldehyde b)alkene c)phenol d)ester e) ketone
3. 

4. 

5. radius= 139 pm
6. Total vapor pressure: 57.6 torr or 0.0758 atm
7. a)No, can only exist above about 400k b) fcc>bcc>hcp c)1 triple point
8.

Lewis dot structure of KrF_2	
VSEPR Class	AX_2E_3
Hybridization	Sp^3d
Electron pair geometry	Trigonal bipyramidal
Molecular geometry	Linear
Bond Angle	90^o and 180^o
Polar or Nonpolar	Nonpolar

9.

a)

	Ion-ion	Dipole-dipole	London/dispersion	H-Bonding	Ion-Dipole
F_2 (g)			x		
SO_2 (g)		x	x		
CH_3CH_2OH (l)		x	x	x	
CH_3OCH_3 (l)		x	x		
KBr (aq)	x	x	x	x	x

b) i)ionic ii) metallic iii) metallic iv) molecular v)network covalent

10)

$\Delta T = iK_f m$

$i = 1$

$\Delta T = 5.444 - 5.144 = (0.300^oC)$

$\Delta T = (1)(5.12°C/m)(m) = 0.300\ ^oC$

$m = 0.0586\ m$

$10.0\ g \Rightarrow 0.0100\ kg$

$0.0586\ m \times 0.0100\ kg = 5.86 \times 10^{-4}\ mol$

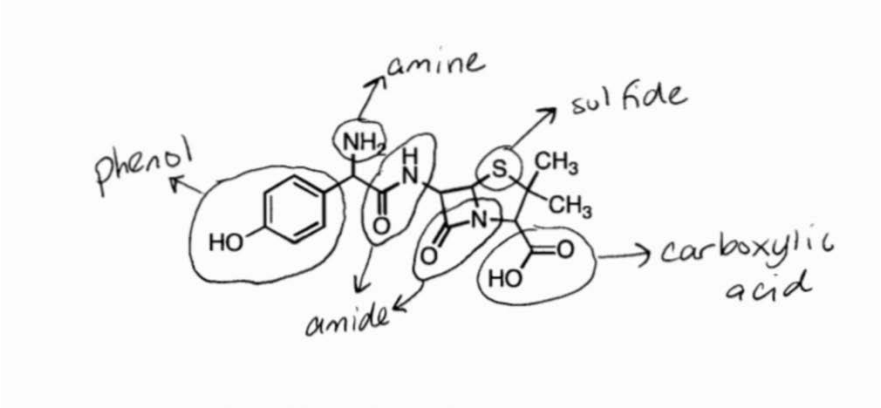
$0.455\ g / 5.86 \times 10^{-4}\ mol = \mathbf{776\ g/mol}$

b) ii is the lowest freezing point because it has the highest molality (3 x 0.15=0.45 m)

11.

Both molecules same geometry (trigonal pyramidal), are polar, and have London forces. London forces $\propto$ MW, AW(N) <AW(P), so lighter NH_3 would have weaker London forces, lower b.p BUT NH_3 **hydrogen bonds**, and that force dominates so NH_3 has higher b.p.

12. P_2 = 0.0870 atm

13. 
amine
sulfide
phenol
NH2
H
N
S
CH3
CH3
HO
O
N
O
HO
O
carboxylic acid
amide