Chamistry 1110 Spring 2024 Tost 2

Chemistry 1110 Spring 2024 Test 2	
Wednesday, February 28, 2024	Time: 1 hour 50 minutes
Name:	Student #:
This test consists of nine pages of questions, a p containing functional group information, and a complete test and, if you do not, obtain one froi three bonus marks) available. Good luck!	
1) [2 marks] At 51.55°C and 1 bar pressure a c 2.0000 g/L. What is the value of n?	ompound of formula OF _n has a density of
2) [2 marks] My watch is water-resistant to a post of 0.9984 g/cm ³ , to how many metres of water-resistant to a post of 0.9984 g/cm ³ , to how many metres of water-resistant to a post of 0.9984 g/cm ³ , to how many metres of water-resistant to a post of 0.9984 g/cm ³ , to how many metres of water-resistant to a post of 0.9984 g/cm ³ , to how many metres of water-resistant to a post of 0.9984 g/cm ³ , to how many metres of water-resistant to a post of 0.9984 g/cm ³ , to how many metres of water-resistant to a post of 0.9984 g/cm ³ , to how many metres of water-resistant to a post of 0.9984 g/cm ³ , to how many metres of water-resistant to a post of 0.9984 g/cm ³ .	oressure of 5 bars. Assuming water has a density ater may I safely take my watch?

3)	[4 marks total] A gas mixture consists of three gases (gas A, gas B, and gas C). The mole fraction of gas A is 0.2. There are three moles of gas B, and the partial pressure of gas C is 10 atm. If the total pressure of the mixture is 20 atm:		
	a)	[2 marks] Calculate the mole fractions of gases B and C.	
	b)	[2 marks] Calculate the partial pressures of gases A and B. Give your answers in atm.	
	c)	[3 marks - BONUS] Calculate the moles of gases A and C.	

4) [4 marks] The following apparatus was assembled:

Bulb 1: Bulb 2:

Volume: 4 litres Volume: 6 litres

Gas: C_2H_2 Gas: H_2

Pressure: 2280 torr Pressure: 1520 torr

The two bulbs were separated by a valve. When the valve was opened, the following reaction occurred:

$$C_2H_2(g) + 2H_2(g) \longrightarrow C_2H_6(g)$$

Both bulbs were maintained at a temperature of 945.51°C before, during, and after reaction. Calculate the partial pressures of all species *after reaction*.

5) [3 marks] A gas of formula SCI_n effuses about 30 percent faster than a gas of formula SCI_{n+2} . What is the value of n?

- 6) [4 marks] For the molecule
 - a) The number of bonding pairs of electrons is: _____
 - b) The number of non-bonding (lone) pairs of electrons is: _____
 - c) The number of sigma bonds is: _____
 - d) The number of pi bonds is: _____

7)	[5 marks] Complete	e the following table for the OC	N ⁻¹ ion (C the centre atom):

- Include all non-zero formal charges.
- Circle the "best" resonance form.
- Draw only non-equivalent resonance forms.

I'll mark only what you write in the table; you can use the rest of the page for rough work (if you wish).

Resonance Form 1	Resonance Form 2	Resonance Form 3

8)	[4 marks] The NO molecule tends to dimerize (attach to another NO molecule) while the NO ⁺ ion does not. Give a possible explanation for this using Lewis structures.
9)	[2 marks] The OCF ₂ molecule (C the centre atom, other atoms attached only to it) has only one possible Lewis resonance form. Why?

10)	[5 marks]	Compl	lete the foll	owing table	for the SO ₂ F ₂	molecule (S the centre	atom)
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- Include all non-zero formal charges.
- Circle the "best" resonance form.
- Draw only non-equivalent resonance forms.

I'll mark only what you write in the table; you can use the rest of the page for rough work (if you wish).

Resonance Form 1	Resonance Form 2	Resonance Form 3

11) [10 marks] Give IUPAC (or other acceptable) names for the following compounds:

(NOT as an ether)

12) [3 marks] Use the formula C₃H₉N to draw one example each of a primary, secondary, and tertiary amine. You do not need to name the compounds you draw, and you may use either the shorthand notation (as discussed in class) or draw all atoms.

13) [8 marks] Give structures consistent with the following names:			
	a)	1,1-diethyl-4-methoxy-2,2-dimethylcyclohexane	
	b)	2-chloroethyl ethyl ether	
	ŕ	, ,	
	c)	4 4-dibromo-5 5-dimethoxyhexan-2-amine	