

Name: _____ Chem D. Finals Review

The final is all related to Semester 2. There will be 10 multiple choice questions all worth 1 point each. These are all basic and you should pick up the content as you start studying for the next part. There will be 18 Problems all worth 5 point. The topic of those 18 problems are listed below along with examples:

There is 100 points total possible on the final. It is worth 100 summative points in the grade book.

1. Periodic Trends: On the periodic table below draw the trend for atomic radii, ionization energy, and electronegativity. Pgs. 361-427

H	He																	He					
Li	Be																	B	C	N	O	F	Ne
Na	Mg																	Al	Si	P	S	Cl	Ar
K	Ca	Sc	Ti	V	Cr	Mn	Fe	Co	Ni	Cu	Zn	Ga	Ge	As	Se	Br	Kr						
Rb	Sr	Y	Zr	Nb	Mo	Tc	Ru	Rh	Pd	Ag	Cd	In	Sn	Sb	Te	I	Xe						
Cs	Ba	X	Lu	Hf	Ta	W	Re	Os	Ir	Pt	Au	Hg	Tl	Pb	Bi	Po	At	Rn					
Fr	Ra	* *	Lr	Rf	Db	Sg	Bh	Hs	Mt	Uun	Uuq	Uub	Uuc	Uud	Uue	Uuf	Uug	Uuh					

* Lanthanide series
** Actinide series

2. Electron Configurations: Write the full electron configurations for the following elements. Pg. 353

- a. Aluminum
 - b. Neon
 - c. Tin
 - d. Potassium
3. Electron Configurations: Use noble gas symbols to write shorthand electron configurations for the following elements. Pg. 353
- a. Silicon
 - b. Rubidium
 - c. Antimony
 - d. Arsenic

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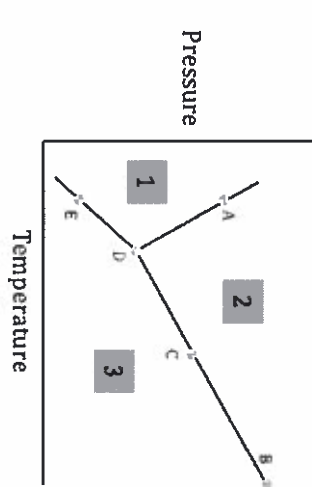
4. Resonance: Draw a resonance structure for the following molecule. Pg. 450



5. VSEPR: Draw the Lewis structures for the following molecules: Pgs. 452, 457-459

- a. NaBr
- b. CH₃Br
- c. C₂H₂Cl₂
- d. SiCl₄
- e. NH₃
- f. CO₂

6. Phase Diagrams: Label the phase diagram below.



- 1. _____
- 2. _____
- 3. _____
- A. _____
- B. _____
- C. _____
- D. _____
- E. _____

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7. **Intermolecular Forces:** What are the three intermolecular forces and put them in order from strongest to weakest force? Pgs. 471-475

8. **Molality:** A solution was prepared by dissolving 17.1 grams of sucrose (table sugar $C_{12}H_{22}O_{11}$) in 125 grams of water. Find the molal concentration of this solution. Pgs. 516-517

9. **Freezing Point Depression:** What is the freezing point depression of water in a solution of 17.1 grams of sucrose (table sugar $C_{12}H_{22}O_{11}$) in 200 grams of water? What is the actual freezing point of the solution? Pgs. 514-521

10. **Calculating pH:** Determine the pH of the following solutions: Pgs. 653-661

- a. 1 E: 3 M HCl
- b. 1 E: 5 M HNO₃
- c. 1 E: 4 M NaOH
- d. 1 E: 2 M KOH

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11. **Titration/Neutralization:** 27.4 mL of 0.0145 M Ba(OH)₂ is added to a 20.0 mL sample of HCl solution of unknown concentration until the equivalence point is reached. What is the molarity of the acid solution? Pgs. 648-651

12. **Calorimetry:** A 4.0 gram sample of glass was heated from 274 K to 314 K, a temperature increase of 40.0 K, and was found to have absorbed 321 J of energy as heat. Pgs. 540-542

a. What is the specific heat of this type of glass?

b. How much energy will the same glass sample gain when it is heated from 314 K to 344 K?

13. **Enthalpy of Formation:** Calculate the standard enthalpies of reaction for combustion reactions in which ethane, C₂H₆, and benzene, C₆H₆, are the respective reactants and CO₂ (g) and H₂O (l) are the products in each. Solve each by combining the known thermochemical equations using the ΔH values [you should have a resource page for this]. Verify the result by using the general equation for finding enthalpies of reaction from enthalpies of formation. Pgs. 547-548

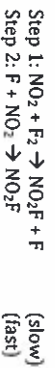
a. C₂H₆ (g) + O₂ (g) →

b. C₆H₆ (l) + O₂ (g) →

14. **Reaction Rates:** What are the four ways that you can change the rate that the reaction will occur? Pgs. 576-583

15. **Mechanisms:** Nitrogen dioxide and fluorine react in the gas phase according to the following equation. Pgs. 586-587
 $2\text{NO}_2(\text{g}) + \text{F}_2(\text{g}) \rightarrow 2\text{NO}_2\text{F}(\text{g})$

A proposed mechanism for this reaction follows:



Determine the rate-determining step. _____

16. **Equilibrium:** An equilibrium mixture of N_2 , O_2 , and NO gases at 1500 K is determined to consist of 6.4 E-3 mol/L of N_2 , 1.7E-3 mol/L of O_2 , and 1.1 E-5 mol/L of NO . What is the equilibrium constant for the system at this temperature? Pgs. 609-613

17. **Le Chatelier's Principle:** Predict the effect of each of the following on the indicated equilibrium system in terms of the direction of equilibrium shift (forward [products], reverse [reactants], or neither). Pgs. 631-624



- addition of chlorine gas
- removal of HCl
- increased pressure
- decreased temperature
- removal of hydrogen gas
- decreased pressure
- addition of a catalyst
- increased temperature
- decreased system volume

18. **Drawing Organic Compounds:** Pgs. 738-763

- 1-methylpropane
- nonane
- 4-methylhexane
- 4-ethyl-2-methylhexane
- 2,2,4,4-tetramethylpentane

19. **Naming Organic Compounds:** Pgs. 738-763

a. _____



b. _____



c. _____

