

Chemistry 150

Exam 2a

Be sure to put your name on each page. This page can be removed from your exam so that you will have a Periodic Table handy throughout the exam, it does not need to be turned in. Show all your work for non-multiple choice problems which require any sort of calculation, no credit will be given for answers without work shown. If you have shown a significant amount of work or multiple drawings for a problem, draw a box around what you consider your final answer.

Avogadro's Number = 6.022×10^{23} units/mol

$32.00^\circ\text{F} = 0.000^\circ\text{C} = 273.15\text{K}$

1 foot = 12 inches

1 inch = 2.54cm (exactly)

1 pound = 453.6 g = 16 ounces

1 amu = 1.6605×10^{-24} g

Masses of subatomic particles:

Proton $1.00728\text{amu} = 1.6726 \times 10^{-24}$ g

Neutron $1.00866\text{amu} = 1.6749 \times 10^{-24}$ g

Electron $0.000549\text{amu} = 9.1094 \times 10^{-28}$ g

Density of Water = $1.000^{\text{g}}/\text{mL}$

$R = 0.08206 \text{ L}\cdot\text{atm}/\text{mol}\cdot\text{K}$

$PV=nRT$

1 H 1.0079																	2 He 4.0026																												
3 Li 6.941	4 Be 9.0122											5 B 10.811	6 C 12.011	7 N 14.007	8 O 15.999	9 F 18.998	10 Ne 20.180																												
11 Na 22.990	12 Mg 24.305											13 Al 26.982	14 Si 28.086	15 P 30.974	16 S 32.066	17 Cl 35.453	18 Ar 39.948																												
19 K 39.098	20 Ca 40.078	21 Sc 44.956	22 Ti 47.88	23 V 50.942	24 Cr 51.996	25 Mn 54.938	26 Fe 55.847	27 Co 58.933	28 Ni 58.69	29 Cu 63.546	30 Zn 65.39	31 Ga 69.723	32 Ge 72.61	33 As 74.922	34 Se 78.96	35 Br 79.904	36 Kr 83.80																												
37 Rb 85.468	38 Sr 87.62	39 Y 88.906	40 Zr 91.224	41 Nb 92.906	42 Mo 95.94	43 Tc (98)	44 Ru 101.07	45 Rh 102.91	46 Pd 106.42	47 Ag 107.87	48 Cd 112.41	49 In 114.82	50 Sn 118.71	51 Sb 121.76	52 Te 127.60	53 I 126.90	54 Xe 131.29																												
55 Cs 132.91	56 Ba 137.33	57 La 138.91	72 Hf 178.49	73 Ta 180.95	74 W 183.84	75 Re 186.21	76 Os 190.23	77 Ir 192.22	78 Pt 195.08	79 Au 196.97	80 Hg 200.59	81 Tl 204.38	82 Pb 207.2	83 Bi 208.98	84 Po (209)	85 At (210)	86 Rn (222)																												
87 Fr (223)	88 Ra 226.03	89 Ac 227.03	104 Rf (261)	105 Db (262)	106 Sg (263)	107 Bh (262)	108 Hs (265)	109 Mt (266)	110 (269)	111 (272)	112 (277)		114		116																														
<table border="1"> <tbody> <tr> <td>58 Ce 140.12</td> <td>59 Pr 140.91</td> <td>60 Nd 144.24</td> <td>61 Pm (145)</td> <td>62 Sm 150.36</td> <td>63 Eu 151.97</td> <td>64 Gd 157.25</td> <td>65 Tb 158.93</td> <td>66 Dy 162.50</td> <td>67 Ho 164.93</td> <td>68 Er 167.26</td> <td>69 Tm 168.94</td> <td>70 Yb 173.04</td> <td>71 Lu 174.97</td> </tr> <tr> <td>90 Th 232.04</td> <td>91 Pa 231.04</td> <td>92 U 238.03</td> <td>93 Np 237.05</td> <td>94 Pu (244)</td> <td>95 Am (243)</td> <td>96 Cm (247)</td> <td>97 Bk (247)</td> <td>98 Cf (251)</td> <td>99 Es (252)</td> <td>100 Fm (258)</td> <td>101 Md (258)</td> <td>102 No (259)</td> <td>103 Lr (260)</td> </tr> </tbody> </table>																		58 Ce 140.12	59 Pr 140.91	60 Nd 144.24	61 Pm (145)	62 Sm 150.36	63 Eu 151.97	64 Gd 157.25	65 Tb 158.93	66 Dy 162.50	67 Ho 164.93	68 Er 167.26	69 Tm 168.94	70 Yb 173.04	71 Lu 174.97	90 Th 232.04	91 Pa 231.04	92 U 238.03	93 Np 237.05	94 Pu (244)	95 Am (243)	96 Cm (247)	97 Bk (247)	98 Cf (251)	99 Es (252)	100 Fm (258)	101 Md (258)	102 No (259)	103 Lr (260)
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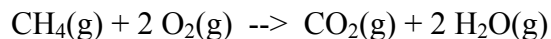
Multiple Choice: Circle the letter of the most correct response. (8pts. per question)

- Under which of the following conditions is a gas most likely to **not** be “ideal”?
 - High temperature, high pressure
 - High volume, low pressure
 - High pressure, low temperature
 - High pressure, high volume
 - Room temperature, 25°C
- Consider the following reaction:
$$a \text{ KBr(aq)} + b \text{ Pb(NO}_3)_2\text{(aq)} \rightarrow c \text{ PbBr}_2\text{(s)} + d \text{ KNO}_3\text{(aq)}$$
For every mol of KBr(aq) that reacts, how many mols of PbBr₂(s) are formed?
 - 0.25 mols
 - 0.5 mols
 - 1 mol
 - 2 mols
 - 3 mols
- Which of the following is **not** a correct gas law relationship?
 - $PV = nRT$
 - $n_1T_1 = n_2T_2$
 - $V_1 / n_1 = V_2 / n_2$
 - $P_1T_1 = P_2T_2$
 - $P_1V_1 = P_2V_2$
- Which of the following is the strongest acid?
 - KOH(aq)
 - HClO₄(aq)
 - HC₂H₃O₂(aq)
 - H₂O(aq)
 - NH₃(aq)
- Which of the following is **not** a redox reaction?
 - $\text{Mg(s)} + 2 \text{ HCl(aq)} \rightarrow \text{MgCl}_2\text{(aq)} + \text{H}_2\text{(g)}$
 - $4 \text{ Fe(s)} + 3 \text{ O}_2\text{(g)} \rightarrow 2 \text{ Fe}_2\text{O}_3\text{(s)}$
 - $2 \text{ C}_2\text{H}_2\text{(g)} + 5 \text{ O}_2\text{(g)} \rightarrow 4 \text{ CO}_2\text{(g)} + 2 \text{ H}_2\text{O(g)}$
 - $\text{NH}_4\text{NO}_3\text{(aq)} + \text{NaC}_2\text{H}_3\text{O}_2\text{(aq)} \rightarrow \text{NH}_4\text{C}_2\text{H}_3\text{O}_2\text{(aq)} + \text{NaNO}_3\text{(aq)}$
 - $\text{AgNO}_3\text{(aq)} + \text{NaCl(aq)} \rightarrow \text{AgCl(s)} + \text{NaNO}_3\text{(aq)}$
- In which of the following formulas does bromine have the highest oxidation number?
 - HBr
 - KBrO
 - Mg(BrO₂)₂
 - Br₂
 - NH₄BrO₃

7. Which of the following would you expect to be soluble in water?

- a. CaCO_3
- b. BaSO_4
- c. Hg_2Br_2
- d. $\text{Mg}(\text{C}_2\text{H}_3\text{O}_2)_2$
- e. $\text{Sn}_3(\text{PO}_4)_2$

8. Consider the following reaction:



What is *oxidized* in this reaction?

- a. $\text{CH}_4(\text{g})$
- b. $\text{O}_2(\text{g})$
- c. $\text{CO}_2(\text{g})$
- d. $\text{H}_2\text{O}(\text{g})$
- e. This is not a redox reaction

Multiple Choice Calculations (12pts each):

9. What is the volume of 6.192mols of ideal gas at 0.651atm pressure and 28.61°C?

- a. 22.3 L
- b. 9.46 L
- c. 6.14 L
- d. 236 L
- e. 99.8 L

10. A 2.65L steel tank contains an ideal gas at 15.83°C and 1.15atm. If the tank is heated to 100.0C, what is the pressure of the gas in the tank?

- a. 7.26 atm
- b. 1.48 atm
- c. 0.182 atm
- d. 0.891 atm
- e. 2.65 atm

11. A reaction produces 834.1mL of ideal gas at standard temperature and pressure (STP). How many mols of gas did the reaction produce?

- a. 37.21 mols
- b. 3.602×10^{-4} mols
- c. 10.16 mols
- d. 0.4066 mols
- e. 0.03721 mols

12. You have dissolved 10.00g of lithium fluoride in enough water to make 250.00mL of solution. What is the concentration of the resulting solution?

- a. 1.542 M
- b. 1038 M
- c. 0.001542 M
- d. 0.8901 M
- e. 40.00 M

Problems: (20pts each)

13. A large compressed air tank contains 325.0L of air at a pressure of 12.39atm pressure in a 24.82°C shop. If the tank is brought outside on a 15.74°C fall day and used to fill car tires, how many tires can be filled? Assume that a car tire has a volume of 24.6L and is filled to a pressure of 2.41atm.

14. 75.0mL of 0.755M magnesium nitrate solution is combined with 75.0mL of 0.755M ammonium phosphate solution.

- Write a correctly balanced equation for the reaction that takes place.
- How many grams of precipitate will this reaction form?