



Polytechnic Tutoring Center

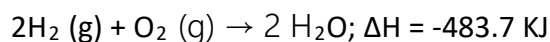
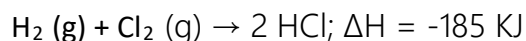
Midterm II REVIEW – CM 1013, Fall 2021

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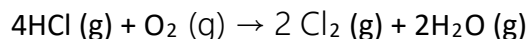
Multiple-Choice Problems:

1. Deviations from the ideal gas law are greatest at:
A) Low temperature and low pressures
B) Low temperature and High pressures
C) High temperature and High pressures
D) High temperature and low pressures
E) Pressure and temperature deviations apply for individual gases

2. From the following data at 25°C:

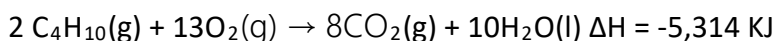


Calculate ΔH at 25°C for the reaction below:



- A) +114 kJ
- B) +299 KJ
- C) -299 KJ
- D) -114 KJ
- E) -86.8 KJ

3. The combustion of butane (C_4H_{10}) produces heat according to the equation:



How much heat is produced from the combustion of 1.00 gram of butane?

- A) 32.5 kJ
- B) 45.7 KJ
- C) 91.5 KJ
- D) 2656 KJ
- E) 15440 KJ

4. The oxidation number of N in NaNO_3 is:

- A) +6
- B) +5
- C) +3
- D) -3
- E) +4

5. Copper metal has a specific heat of $0.385 \text{ J/g}^\circ\text{C}$ and has a melting point of 1083°C . Calculate the amount of heat required to raise the temperature of 22.8 g of Cu from 20.0°C to 875°C

- A) $1.97 \times 10^{-5} \text{ J}$
- B) $1.00 \times 10^{-2} \text{ J}$
- C) 329 J
- D) 7.51 KJ
- E) 10.5 KJ

6. Which of the following is an acid-base neutralization reaction?

- A) $2\text{Al}(\text{s}) + 3\text{H}_2\text{SO}_4(\text{aq}) \rightarrow \text{Al}_2(\text{SO}_4)_3(\text{aq}) + 3\text{H}_2(\text{g})$
- B) $\text{SO}_2(\text{g}) + \text{H}_2\text{O}(\text{l}) \rightarrow \text{H}_2\text{SO}_3(\text{g})$
- C) $\text{LiOH}(\text{aq}) + \text{HNO}_3(\text{aq}) \rightarrow \text{LiNO}_3(\text{aq}) + \text{H}_2\text{O}(\text{l})$
- D) $2\text{KBr}(\text{aq}) + \text{Cl}_2(\text{g}) \rightarrow 2\text{KCl}(\text{aq}) + \text{Br}_2(\text{l})$
- E) $\text{CaBr}_2(\text{aq}) + \text{H}_2\text{SO}_4(\text{aq}) \rightarrow \text{CaSO}_4(\text{s}) + 2\text{HBr}$

7. Calculate the volume occupied by 225.2 g of CO_2 at 0.84 atm and 25°C . Assume ideal gas

- A) 60 L
- B) 134 L
- C) 149 L
- D) 24.2 L
- E) 734 L

8. The gas pressure in an aerosol can is 1.80 atm at 25°C . If the gas is an ideal gas, what pressure would develop in the can if it were heated to 475°C ?

- A) 0.0950 atm
- B) 0.717 atm
- C) 3.26 atm
- D) 4.52 atm
- E) 34.2 atm

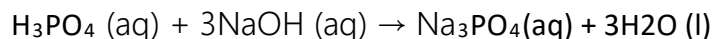
9. Which of the following compounds is a strong electrolyte?

- A) H₂O
- B) N₂
- C) KI
- D) CO₂
- E) HF

10. A mixture of three gases has a total pressure at 298 K of 1380 Torr. The mixture is analyzed and is found to contain 1.27 mol CO₂, 3.04 mol CO, and 1.50 mol Ar. What is the partial pressure of Ar in the sample?

- A) 258 torr
- B) 301 Torr
- C) 356 Torr
- D) 5345 Torr
- E) 8020 Torr

11. If 40.0 mL of H₃PO₄ solution is titrated to the end point with 67.5 mL of 0.50 M NaOH, what is the molarity of the H₃PO₄ solution?



- A) 0.10 M
- B) 0.28 M
- C) 0.30 M
- D) 0.84 M
- E) 0.95 M

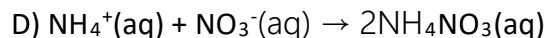
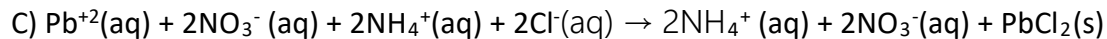
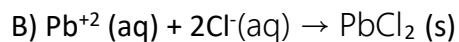
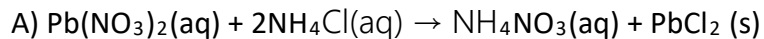
12. What is the molarity of a solution in which 26.0 grams of BaCl₂ (molar mass=208.2g/mol) are dissolved in enough water to make 450.0 mL of solution?

- A) 0.278 M
- B) 0.617 M
- C) 1.00 M
- D) 3.41 M
- E) 12.0 M

13. A system absorbs 5 J of heat from the surroundings and does 10 J of work on the surroundings. What is the change in energy of the system?

- A) +15J
- B) +5 J
- C) .5 J
- D) -5 J
- E) -15 J

14. Which of the following is the correct net ionic equation for the reaction that occurs when solutions of $\text{Pb}(\text{NO}_3)_2$ and NH_4Cl are mixed?



15. Which of the following gases will have the lowest density when they are all compared at the same temperature and pressure?

A) H_2

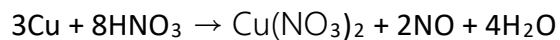
B) O_2

C) N_2

D) Cl_2

E) All have the same

16. Which element is oxidized in the following reaction?



A) Cu

B) H

C) N

D) O

E) Cannot be determined

17. In which of the following gases do molecules have the highest average speed at 25°C

A) H_2

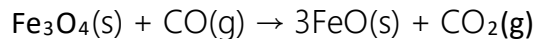
B) O_2

C) N_2

D) Cl_2

E) All have the same

18. Given the standard enthalpies of formation for the following compounds, calculate ΔH , the reaction enthalpy, for the following reaction:



$$\Delta H_f \text{ for } \text{Fe}_3\text{O}_4 = -1118 \text{ KJ}$$

$$\Delta H_f \text{ for } \text{CO} = -110.5 \text{ KJ}$$

$$\Delta H_f \text{ for } \text{FeO} = -272 \text{ KJ}$$

$$\Delta H_f \text{ for } \text{CO}_2 = -393.5 \text{ KJ}$$

A) 54 KJ

B) 19 KJ

C) -263 KJ

D) -50 KJ

E) 109 KJ

3. A student mixes 25.0 mL of 1.0 M HBr(aq) and 25.0 mL of 1.0 M KOH (aq) in a coffee cup (constant pressure) calorimeter. The temperature of the solution is increased from 25°C to 31.7°C. Calculate the ΔH per mole of HBr of the acid-base neutralization reaction that occurs? (You may assume that the density of the solution is equal to the density of water, and that the specific heat of the solution is equal to the specific heat of water.)