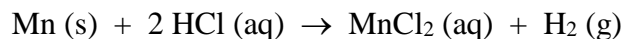


REVIEW QUESTIONS**Test 2**

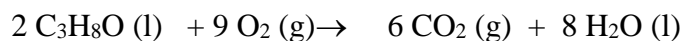
1. A cylinder with a moving piston expands from an initial volume of 0.250 L against an external pressure of 2.00 atm. The expansion does 288 J of work on the surroundings. What is the final volume of the cylinder?

2. Manganese reacts with hydrochloric acid to produce manganese (II) chloride and hydrogen gas.



When 0.625 g of Mn is combined with enough HCl to make 100.0 mL of solution in a coffee-cup calorimeter, all of the Mn reacts, raising the temperature of the solution from 23.5°C to 28.8°C. Find ΔH_{rxn} for the reaction as written. (Assume specific heat and density of solution are the same as that of water).

3. The standard heat of reaction (ΔH°) for the reaction shown below is -1985 kJ . Based on the ΔH°_f given for each substance, determine the ΔH°_f for $\text{C}_3\text{H}_8\text{O}$.

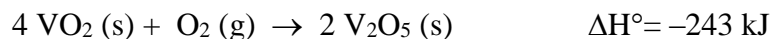
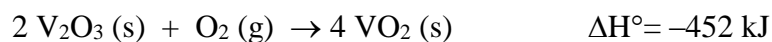
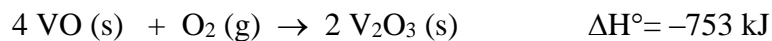


ΔH°_f (kJ/mol)	???	0	-394	-286
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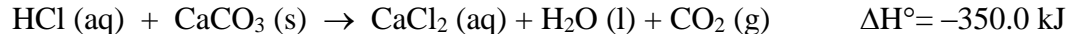
4. Find ΔH° (in kJ) for the reaction shown below:



from the following given reactions:



5. Given the heat of reaction (ΔH°) for the reaction shown below, what is ΔE° for this reaction?



6. Molybdenum metal has a threshold frequency of $1.09 \times 10^{15} \text{ s}^{-1}$ before it can emit an electron from its surface by photoelectric effect. If Mo is radiated by a light with a wavelength of 120. nm, would it emit an electron? If so, what would be the maximum velocity of the electron emitted?

7. Calculate the wavelength of 50-g golf ball travelling at 400 m/s. (Calculate answer to 2 significant figures)

8. Neutron diffraction is an important technique for determining the structures of molecules. Calculate the velocity of a neutron with a wavelength of 0.088 nm. (mass of neutron = 1.675×10^{-24} g)

9. The heat of combustion of glucose is 15.57 kJ/g. A 2.500-g sample of glucose is burned in a bomb calorimeter containing 2.700 kg of water. The temperature of the calorimeter and the water increased from 20.55°C to 23.25°C. What is the heat capacity of the dry calorimeter?

10. When 2.00 g of HF gas is bubbled through 400. mL of water at 20.6°C, all the gas dissolves and the temperature of the solution rises to 24.3°C. What is the enthalpy change of solution (ΔH_{soln}) for HF? (Assume density and specific heat of solution to be the same as pure water)

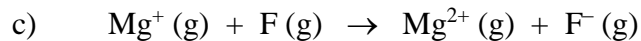
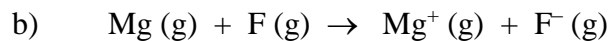
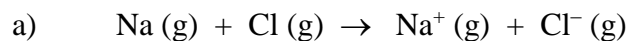
11. The electron affinities (EA) for the elements from Al to Cl (in kJ/mol) are :

Al (-44) Si (-120) P (-74) S (-200.4) Cl (-348.7)

a) What is the general trend of EA among these atoms? Explain the reason for this trend.

b) Explain why phosphorous has a lower EA than Si.

12. Using data from your textbook, calculate the change in energy expected for each of the following processes:



Answers:

1. 1.67 L
2. -195 kJ
3. -1330 kJ/mol
4. +405 kJ
5. -352.5 kJ
6. 1.43×10^6 m/s
7. 3.3×10^{-35} m
8. 4.5×10^3 m/s
9. 3.13 kJ/°C
10. -62 kJ/mol
11. No answers provided
12. a) 147 kJ b) 410 kJ c) 1122 kJ