

## Chapter 19

③ positive,  $\uparrow$  in number molecules

④ a) 1. melting  
2. boiling/ evaporation

b) increase in spacing between molecules in gas than liquid

⑤ a) at equilibrium  $\Delta G = 0$

b)  $\Delta G = \Delta H - T\Delta S$   
 $> 300 \text{ K}$  when  $\Delta G = \text{negative}$

⑩ a) spontaneous

b) nonspontaneous

③③ a) negative / decreases

b) negative / decreases

c) positive / increases

③④ a) increases

b) increases

c) increases

④④ a) same phase, same temp, same KE

$$KE = \frac{1}{2}mv^2 \quad \uparrow \text{ molar mass} \quad \downarrow \text{ velocity}$$

$P_4$  will be moving faster therefore higher entropy

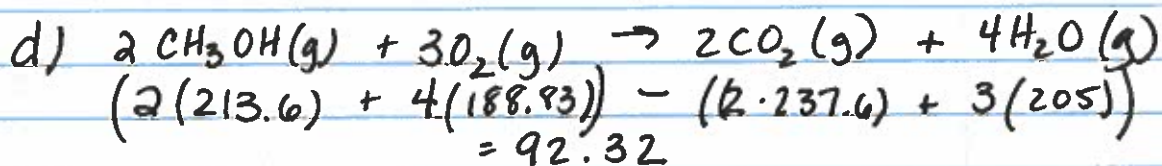
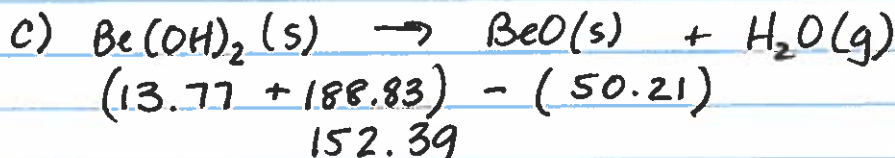
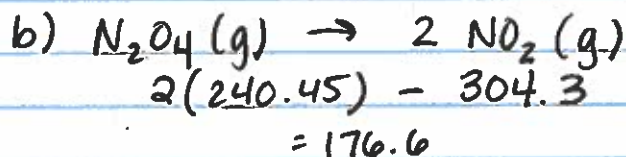
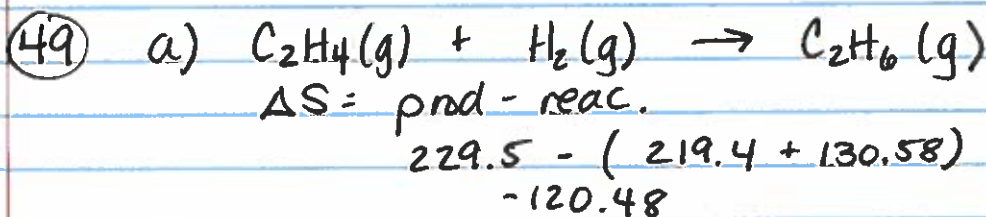
b) gas

## Chapter 1a continued...

c)  $\text{CH}_4$  less molar mass

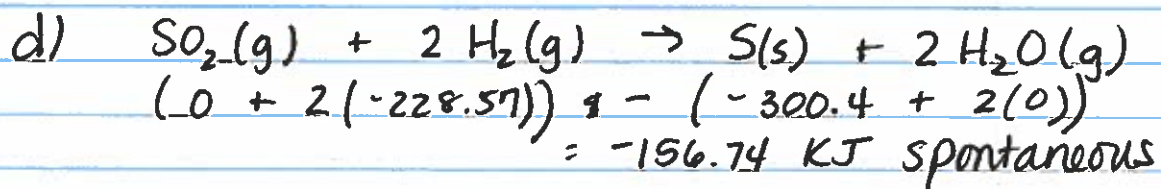
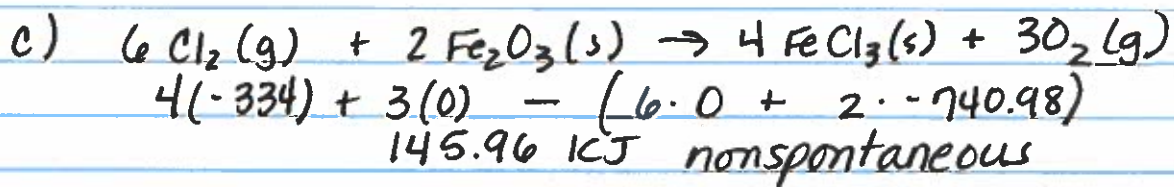
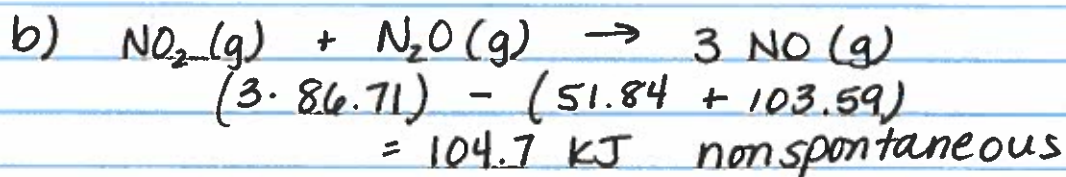
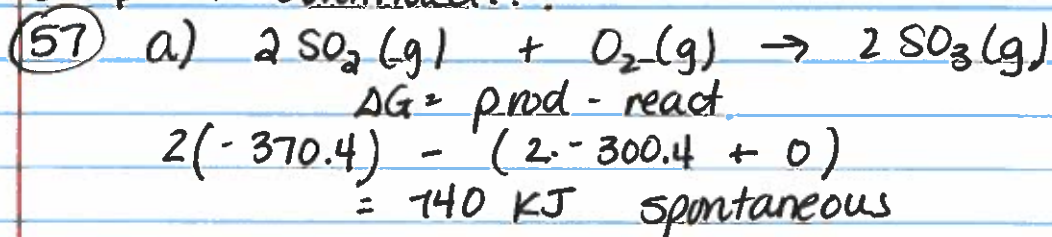
d) aqueous

- (41) a) negative, decrease  
b) increases = positive (phase change)  
c) decrease = negative (phase + ↓ molecules)  
d) increase = positive ↑ molecules



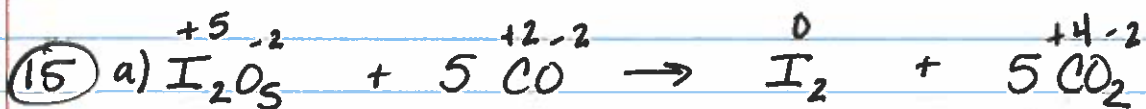
- (53) a) exothermic  
b) decrease  
c)  $\Delta G = \Delta H - T\Delta S$   
 $= -35.4 - (298 \cdot \frac{-85.5}{1000})$   
 $= -9.921 \text{ kJ}$   
spontaneous

Chapter 19 continued...





## Chapter 20



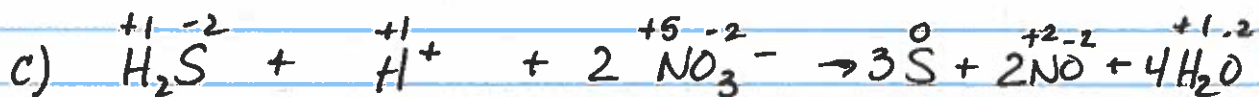
I is reduced from +5 to 0 change -5

C is oxidized from +2 to +4 change +2



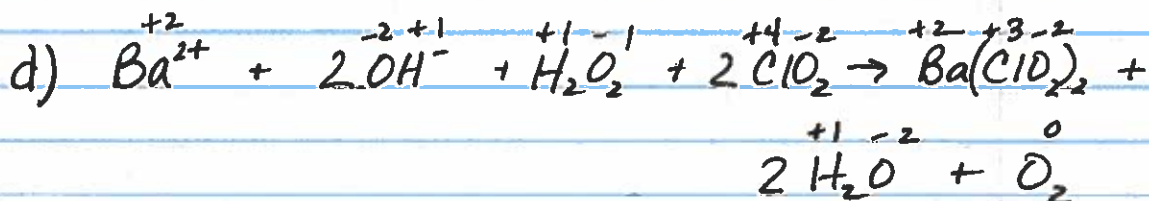
Hg is reduced from +2 to 0 change -2

N is oxidized from -2 to 0 change +2



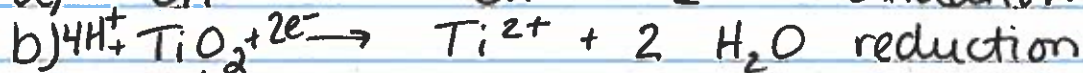
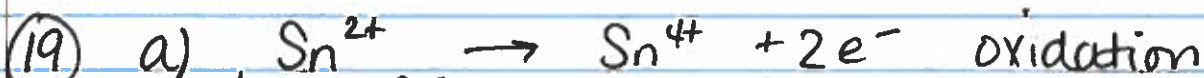
S is oxidized from -2 to 0 change +2

N is reduced from +5 to +2 change -3

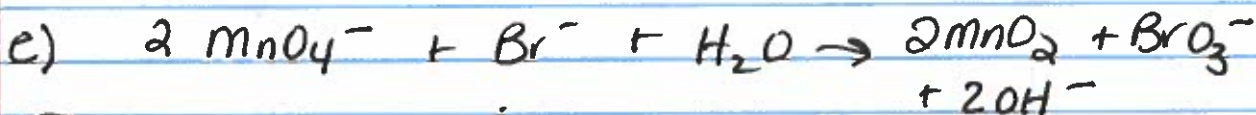
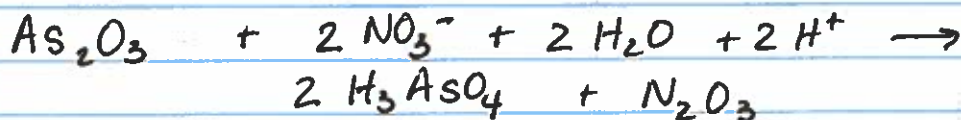
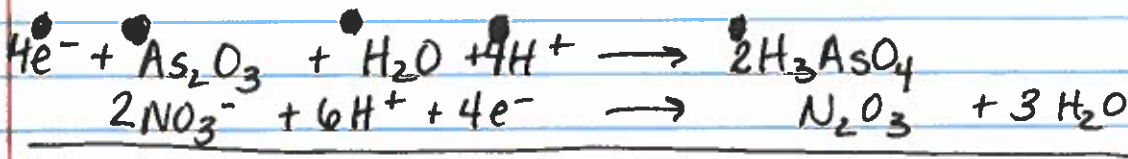
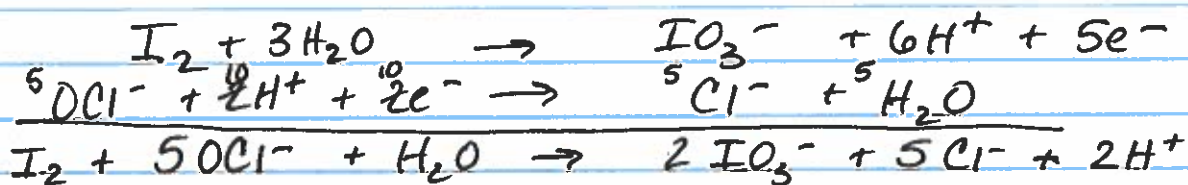
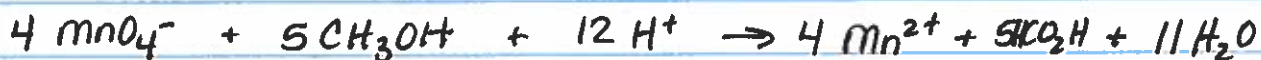
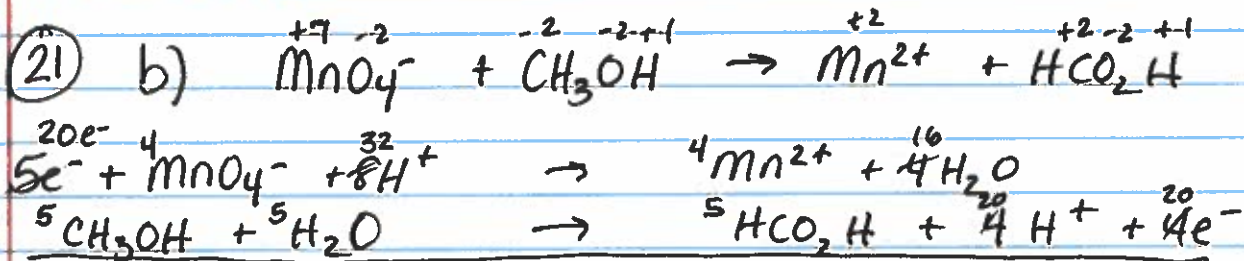


O is oxidized from -1 to 0 change +1

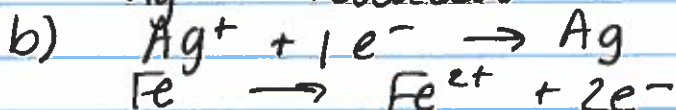
Cl is reduced from +4 to +3 change -1



## Chapter 20



(25) a) Fe = oxidized  
Ag<sup>+</sup> = reduced



c) Fe = anode  
Ag = cathode

Chapter 20 continued...

25 d) Fe is negative

Ag is positive

e) electrons flow from the Fe electrode (-) to the Ag electrode (+)

f) cations migrate toward the Ag(s) cathode  
anions migrate toward the Fe(s) anode

35) a)  $\text{Cl}_2$  - reduced = 1.359  
I<sup>-</sup> oxidized = 0.536

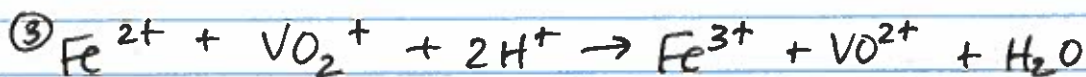
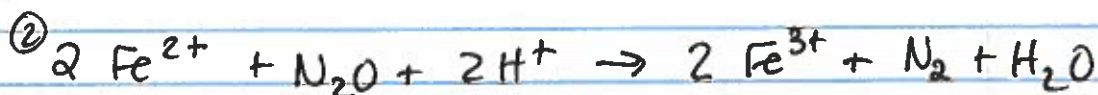
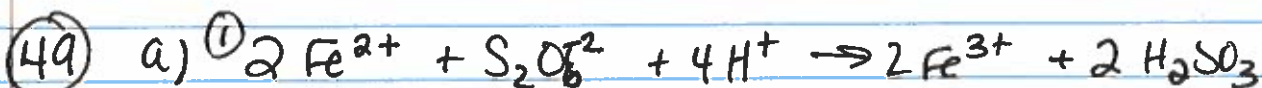
$$E^\circ_{\text{cell}} = E^\circ_{\text{cathode (red)}} - E^\circ_{\text{anode (oxid)}} = 1.359 - 0.536$$

$$= 0.823 \text{ V}$$

b) 1.89 V

c) 1.21 V

d) 1.21 V



b) ①  $E^\circ_{\text{cell}} = .6 - .77 = -0.17$

$$\Delta G = -nFE^\circ$$

$$= -2 \cdot 96,485 \cdot -0.17$$

# e<sup>-</sup> in redox reaction

$$\Delta G = 33 \text{ KJ} \quad \text{nonspontaneous}$$



②  $E^{\circ}_{\text{cell}} = -2.54 \text{ V}$   
 $\Delta G = 4.90 \times 10^2 \text{ kJ}$  nonspontaneous

③  $E^{\circ}_{\text{cell}} = 0.23 \text{ V}$   
 $\Delta G = -22 \text{ kJ}$  spontaneous

c) ①  $\Delta G = -RT \ln K$   
 $33000 = -(8.314)(298) \ln K$   
 $\ln K = -13.32$   
 $e^{\ln K} = e^{-13.32}$   
 $K = 1.6 \times 10^{-6}$  reactant favored

②  $K = 1.28 \times 10^{-86}$  reactant favored

③  $K = 7.18 \times 10^3$  product favored