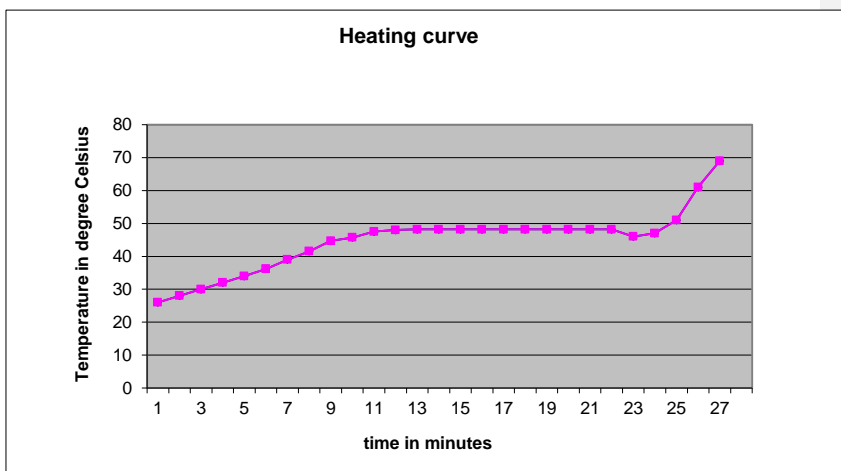


Spring Practice Final 2018
Honors Chemistry

1. Using the graph from a melting crystal solid below answer the questions:



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What is the freezing point of the solid? What temperatures would there be only a solid? Only a liquid? Both liquid and solid?

2. Define the following as exothermic or endothermic:

Condensing of a gas _____

Reaction in which the products are higher in potential energy than the reactants _____

Reaction in which the products are lower in potential energy than the reactants _____

Freezing of a liquid _____

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3. For the following reactions, circle the correct answers:

Reaction

$2N_2O_5 + 110 \text{ kJ} \rightarrow 4NO_2 + O_2$ Endothermic/Exothermic Heat Released/Absorbed

$Mn + 2HCl \rightarrow MnCl_2 + H_2 + 221 \text{ kJ}$ Endothermic/Exothermic Heat Released/Absorbed

$P_4O_{10} + 6H_2O \rightarrow 4H_3PO_4$ $\Delta H = -424 \text{ kJ}$ Endothermic/Exothermic Heat Released/Absorbed

$3O_2 \rightarrow 2O_3$ $\Delta H = 285.4 \text{ kJ}$ Endothermic/Exothermic Heat Released/Absorbed

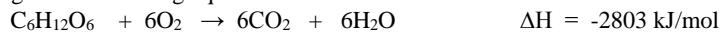
2.4. Gold has a specific heat of 0.129 J/g°C. How many joules of heat energy are required to raise the temperature of 15 grams of gold from 22 °C to 85 °C?

3.5. To what temperature will a 50.0 g piece of glass raise if it absorbs 5275 joules of heat and its specific heat capacity is 0.50 J/g°C? The initial temperature of the glass is 20.0°C.

4.6. A 22.9 gram piece of metal is initially at 100.°C. When placed in 71.9 mL of 20.5 °C water it raised the temperature to 25.6 °C. Using the chart below, what type of metal is this?

Metal	Specific Heat (J/g°C)
Aluminum	0.90
Iron	0.46
Platinum	0.13
Silver	0.24
Tin	0.23

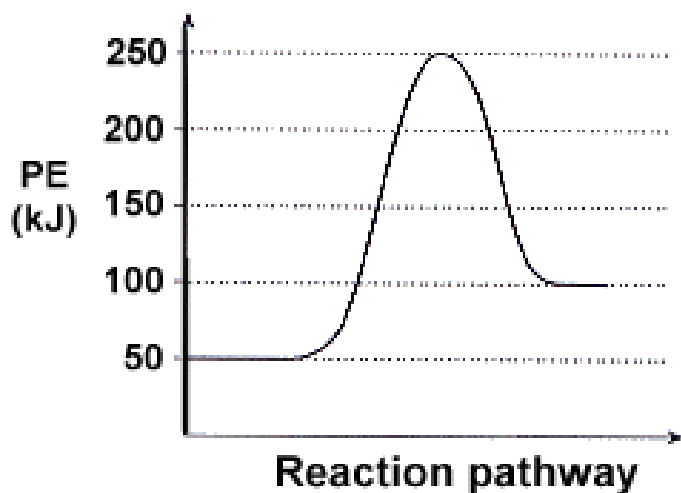
5.7. How much heat is released when 9.22 grams of glucose C₆H₁₂O₆ in your body reacts with according to the following equation?



6.8. Calculate the heat released when 74.6 grams of SO₂ reacts according to the following equation.

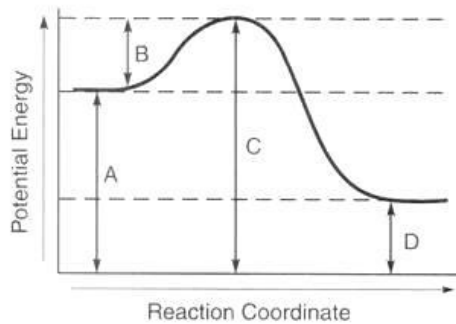


Use the potential energy diagram below to answer 9-19.



9. The heat of the reactants of the forward reaction is _____ kilojoules.
10. The heat of the products of the forward reaction is _____ kilojoules.
11. The activation energy of the forward reaction is _____ kilojoules.
12. The energy of reaction (ΔH) of the forward reaction is _____ kilojoules.
13. Is the forward reaction endothermic or exothermic?
14. The heat of the reactants of the reverse reaction is _____ kilojoules.
15. The heat of the products of the reverse reaction is _____ kilojoules.
16. The activation energy of the reverse reaction is _____ kilojoules.
17. The energy of reaction (ΔH) of the reverse reaction is _____ kilojoules.
18. Is the reverse reaction endothermic or exothermic?
19. Label the reactants, products, and activated complex.

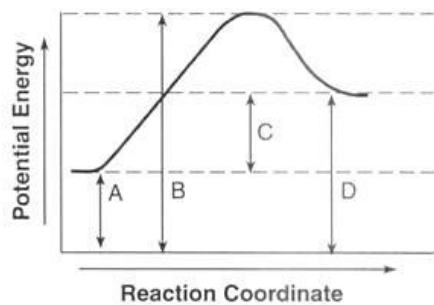
Use the following potential energy diagram to answer 20-21.



20. Is the forward reaction exothermic or endothermic?

21. What letter represents the activation energy of the forward reaction?

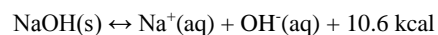
Use the following potential energy diagram to answer 22-23.



22. Is the forward reaction exothermic or endothermic?

23. What letter represents the heat of the reaction of the forward reaction?

24. Use the equation below to answer the following:



*****Hint: Pure liquids and solids do not affect equilibrium values!*****

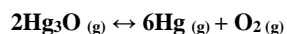
Stress	Equilibrium Shift	Amount of NaOH	[Na ⁺]	[OH ⁻]
Add NaOH(s)		-----		
Add NaCl (adds Na ⁺)			-----	
Add KOH (adds OH ⁻)				-----
Add H ⁺ (decreases OH ⁻)				-----
Increase temperature				
Decrease temperature				
Increase pressure				
Decrease pressure				

25. What would happen to the position of equilibrium (which direction will it shift) when the following changes are made to the reaction below?



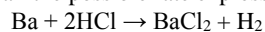
- (a) Sulfur dioxide is added to the system _____
- (b) Sulfur trioxide is removed from the system _____
- (c) Pressure is increased _____

26. What would happen to the position of equilibrium when the following changes are made to the exothermic reaction below?

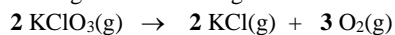


- (a) Hg₃O is added to the system _____
- (b) The volume of the system decreases _____
- (c) Temperature is increased _____

27. What are all the possible rate expressions for the following reaction?

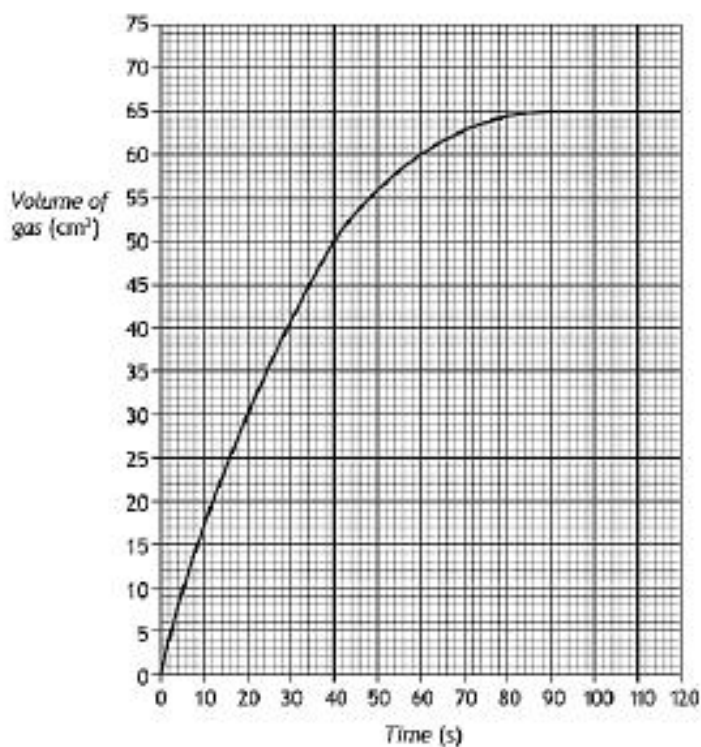


28. According to the following reaction:



If the rate of appearance of oxygen gas is $4.00 \times 10^{-2} \text{ M/s}$, what is the rate of disappearance of $\text{KClO}_3(\text{g})$?

Use the graph below to answer questions 29-30. The graph below shows the volume of gas produced in an experiment over a period of time.



29. Calculate the average rate of reaction, in cm^3/s , for the first 20 seconds.

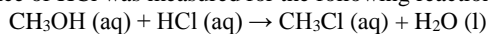
30. Draw a line representing the reactant.

31. The molar heat of fusion of water is 6.02 kJ/mol . Calculate the energy required to melt 46.8 g of ice.

32. When 2.5 g of methane vaporizes to form 2.5 g of methane gas, the process is exothermic/endergonic.

Use the following scenario for 33 and 34:

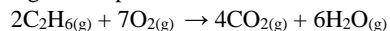
The rate of disappearance of HCl was measured for the following reaction:



The following data was obtained:

Time (s)	[HCl] (M)
0	1.62
54	1.38
107	1.16
215	0.82
430	0.48

33. What is the rate of disappearance for HCl between 107 s and 215 s?
34. If 1.65 M of CH₃OH was present at the beginning of the reaction, how much remains at 430s?
35. Over an interval of 1.00 s, the mass of ethane, C₂H₆, changes by -2.62 g. What is the corresponding rate of production of carbon dioxide in mol/s?



36. Draw a graph of the relationship between equilibrium and temperature for an endothermic reaction and exothermic reaction. (2 graphs)

37. Discuss the changes that ethanol goes through from -120°C to 80°C.

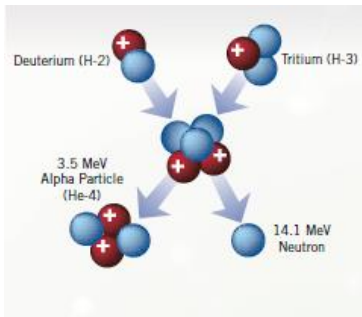
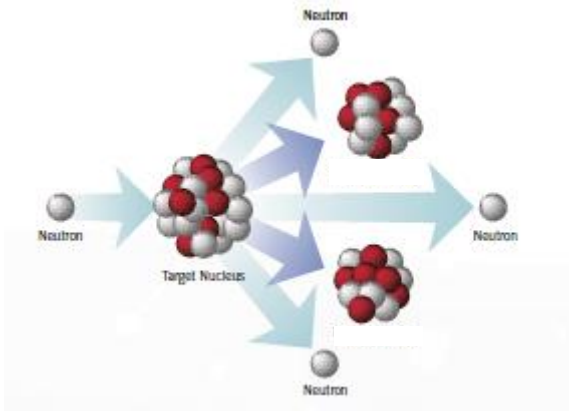
Boiling point of ethanol: 78.5°C

Melting point of ethanol: -114.5°C

38. What are the types of radioactive decay? Which one has the most penetrating power? Least penetrating power? Which one is energy?

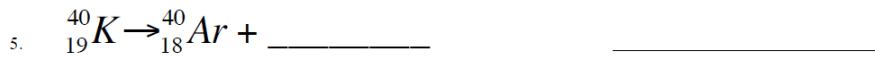
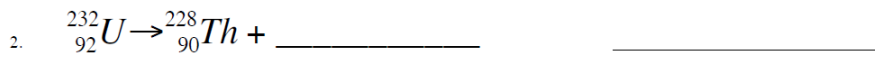
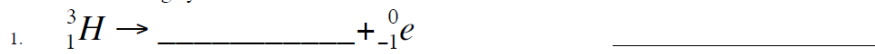
39. How does concentration effect rate? WHY?

40. Is the following fission or fusion:



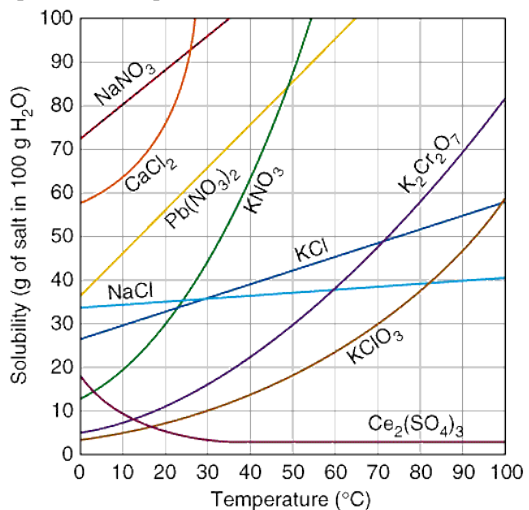
41.

Fill in the missing symbol and name the reaction:



42. The half-life of chromium-51 is 28 days. If the sample contained 510 grams, how much chromium would remain after 56 days? How much would remain after 1 year? How much was present 168 days ago?
43. It took 6 years for a 4.0 mg sample of isotope X to decay to only 0.50 mg. What is the half-life of isotope X?
44. What does a star start from?
45. Why is a black hole called “black”?
46. What is the life cycle for a very large mass star?
47. What elements does the sun ideally burn and produce during nuclear fusion?
48. What is the freezing point of an aqueous solution made from 23.5g of $C_6H_{12}O_6$ (nonelectrolyte) dissolved in 350g of water? ($K_f = 1.86 \text{ }^\circ\text{C/m}$)
49. Label the following as either a physical, chemical, or nuclear change:
- $CH_4(g) \rightarrow CH_4(l)$ _____
- $CaCl_2(aq) + 2AgNO_3(aq) \rightarrow 2AgCl(s) + Ca(NO_3)_2(aq)$ _____
- ${}^{23}_{11}\text{Na} \rightarrow {}^0_1\text{e} + {}^{23}_{10}\text{Ne}$ _____
- $C(\text{coal}) \rightarrow C(\text{graphite})$ _____
50. A saturated solution is made by dissolving 12.4 g of a solid in 300 mL of water. A second solution is made by dissolving 5.6 g of the same solid in 75 mL of water. What is the second solution (saturated/unsaturated/supersaturated)?

Use the solubility graph below for questions 51-52.



51. Using the graph above, which salt is MOST soluble at 28°C?
52. What mass of KNO₃ can be dissolved in 50 grams of H₂O at 20°C?
53. From the equilibrium, which of the following would favor the production of water?
$$2\text{H}_2(\text{g}) + \text{O}_2(\text{g}) \rightarrow 2\text{H}_2\text{O}(\text{g}) + 483.6 \text{ kJ}$$
54. What is the half-life of Po-214 if 1/32 remains after 820 seconds?