1. **Compression Work1**

Calculate the quantity of work, in J, when a gas is compressed from 2.3 L to 0.6 L by a constant external pressure of 7.79 atm.

2. **First Law (-w,+q) find dU1**

Determine the change in internal energy (in kJ) of a system if the system does 239 kJ of work on the surroundings and 235 kJ of heat is transferred to the system from the surroundings?

3. **Expt Det of Metal Specific Heat**

When a149 g sample of a metal at 241°C is dropped in 314 g of water, the temperature of the water increases from 25°C to 30°C. Given that the specific heat of water is 4.184 J/g°, what is the heat capacity of the metal (in J/g°).

4. **The reaction of glucose C6H12O6 with oxygen gas p -**

The reaction of glucose ($C_6H_{12}O_6$) with oxygen gas produces carbon dioxide and water. The energy released during this reaction is 2803 kJ/mol of glucose. If 18 moles of oxygen are used, how many kilocalories are released during the reaction?

Student Response
a. $2.010x10^3$
b. 6695
c. 2003
d. 12.69
e. 5987

5. **- A reaction took place in four steps. Each step gave -**

A reaction took place in four steps. Each step gave off 100 cal of heat. In the fourth step there was also a decrease in volume by 76.0 L at a pressure of 800 mm Hg. What was the energy change in joules for the overall reaction?

Student Response
a. +228
b. -1.59×10^3
c. -6.12×10^4
d. -480
e. $+6.43 \times 10^3$

6. **Chapter05-047**

Given the following reactions

is _____ kJ.

Student Response
a. 145.7
b. 343.9
c. -343.9
d. 17.5
e. -145.7

7. **Enthalpy of Reaction from Formation Values Calc.**

Calculate the enthalpy change ΔH_{rxn} (in kJ) for the following hypothetical reaction:

$$2A + 7B \rightarrow 7C + 10D$$

The formation enthalpies are tabulated as follows:

	A	B	C	D
$\Delta H°_f$ (kJ/mol)	329.5	-169.6	201.3	-169.7

8. **Bomb Calorimeter Calc**

The heat capacity of a bomb calorimeter was determined by burning 1.3 moles of compound X (heat of combustion = 575 kJ/mol) in the bomb. The temperature

increased by 32<°. When 0.8 moles of compound Y is combusted in the same calorimeter, the temperature of the calorimeter increases by 22.5°. What is the heat capacity of compound Y?

9-20 KINETICS

9. - For the reaction 2SO3 2SO2 + O2 calculate the aver -

For the reaction $2SO_3 \rightarrow 2SO_2 + O_2$ calculate the average rate, $\Delta[SO_3]/\Delta t$, between 10.0 min and 40.0 min for the loss of SO_3.

Time, min:	0.0	10.0,	20.0	30.0,	40.0	50.0
$[SO_3]$, M	0.124	0.092	0.068	0.050	0.037	0.028
$[SO_2]$, M:	0.0	0.032	0.056	0.074	0.087	0.096
$[O_2]$, M	0.0	0.016	0.028	0.037	0.044	0.048

Student Response
a. 2.2×10^{-4} M min^{-1}
b. 1.8×10^{-3} M min^{-1}
c. 1.1×10^{-3} M min^{-1}
d. 5.5×10^{2} M min^{-1}
e. 4.6×10^{2} M min^{-1}

10. Determine Rate (monitor reactant B)

The reaction

$$4A + 3B \rightarrow 2C + 4D$$

is monitored by measuring the decrease in the concentration of B over time. The concentration of B was found to be 14.3 M after 29.2 minutes had elapsed, and 8.78 M after 122.2 minutes had elapsed. What is the reaction rate (in M/min)?

11. Exp Rate Law (A+B Rx)

For a reaction in which A and B react to form C, the following initial rate data were obtained:

Experiment	[A], M	[B], M	initial rate, M/s:
1	0.2	0.2	0.50
2	0.4	0.2	2.00
3	0.8	0.2	8.00
4	0.2	0.4	1.00
5	0.2	0.8	2.00

The rate law for this reaction has the general form

$$\text{Rate} = k[A]^a[B]^b$$

Determine (1) a, the order with respect to A; (2) b, the order with respect to B; (3) the overall order

12. **Value of K**

For the hypothetical reaction $A + B \rightarrow$ products, the rate law is found to be

$$R = k[A]^1[B]^2$$

when $[A]_0$ =5.9 M and $[B]_0$ = 0.7 M, the initial rate = 3.23×10^2 M s^{-1}. What is the value of the rate coefficient, k?

13. **- In a first-order rate expression, what are the unit -**

In a first-order rate expression, what are the units for the rate constant?

Student Response
a. time^{-1}
b. time
c. (M time)$^{-1}$
d. time M^{-1}
e. unitless

14. **t-Half for 1 order**

Determine the half-life (in s) for the reaction A $\rightarrow$products, given that the reaction is first order, k = 1.707s^{-1} and $[A]_o$ = 4.16759

15. **First Order A given t1/2 and t**

A certain first order process

$$A \rightarrow \text{products}$$

has a half-life of 41.9 minutes. If a reaction vessel is initially charged with 445 mmHg of A, what will the partial pressure of A be after 25.8 minutes have elapsed.

16. **Collision Attributes**

Consider the reaction

$$H_2 + I_2 \rightarrow 2HI$$

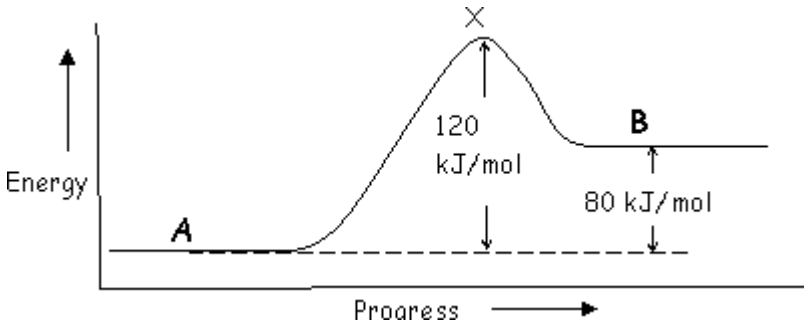
1. In order for a collision between H_2 and I_2 to lead to products, what two attributes must the collision possess?
2. Explain how each of the following changes would improve the odds of a successful reaction event
    a. Increasing temperature
    b. Increasing the concentrations of H2 and/or I2
    c. Adding a catalyst

17. Endo Profile

Consider the following energy profile diagram for the reaction

$$A \rightarrow B$$

1. Is this an exothermic or endothermic reaction?
2. What is point X called?
3. ΔH_{rxn} is _____ kJ/mol
4. The activation energy for the reaction $A \rightarrow B$ is _____ kJ/mol
5. The activation energy for the reaction $B \rightarrow A$ is _____ kJ/mol



18. Arrhenius Calc Find Ea

The hypothetical reaction

$$AB \rightarrow A_2 + B_2$$

has a rate coefficient of 3.0×10^{-15} s^{-1} at 187 K and a rate coefficient of 1.6×10^{-7} s^{-1} at 875 K. What is the activation energy for this reaction (in kJ/mol). *R = 8.314*

J/(molK)

19. Molecularity 3

Assign the correct molecularity to each of the following elementary reactions:

1. $2NO_2 \rightarrow 2NO + O_2$	Unimolecular
2. $2NO + Br_2 \rightarrow 2NOBr$	Termolecular
3. $SO_2Cl_2 \rightarrow SO_2 + Cl_2$	Bimolecular
4. $NO_2 + F_2 \rightarrow NO_2F + F$	

20. Steady-State Mechanism Ozone

A mechanism for the decomposition of ozone:: $2O_3(g) \rightarrow 3O_2$ is:

$$O_3(g) \underset{k_{-1}}{\overset{k_1}{\rightleftharpoons}} O(g) + O_2(g)$$

$$O_3(g) + O(g) \xrightarrow{k_2} 2O_2(g)$$

Applying the steady-state approximation the following rate law is obtained.

$$R = \frac{k'X^2}{X + k''Y}$$

What is X and Y?

X	a. O_3
Y	b. O_2
	c. O