

Chemistry Lab 2016-2017
Thermodynamics and Gases

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Part 1: Thermodynamics

Multiple Choice: (1 point each)

1. D
2. B
3. D
4. B
5. A
6. C
7. B
8. A
9. A
10. C
11. C
12. C
13. C
14. C
15. B
16. C
17. B
18. B
19. D
20. D
21. B
22. A
23. C
24. E
25. B

Short Answer: (All calculations are acceptable to within 10%)

Problems that require use of a previous *calculation* problems' answer to solve may be counted correct even if the previous answer was incorrect as long as it follows the correct steps (not incorrect balanced chemical equations or formulas)

1. Problem 1

- a. $3H_2C_2O_4 + 2Al(OH)_3 \rightarrow Al_2(C_2O_4)_3 + 6H_2O$ (1)
- b. $H_2C_2O_4$ (1)
- c. 0.334 g (1)
- d. 41.6 J evolved (1)
- e. 73.05% (1)

2. Problem 2

- a. $-32.11 \frac{kJ}{mol}$ (2)
- b. $-90.91 \frac{J}{mol \cdot K}$ (2)
- c. $50.79 \frac{kJ}{mol}$ (2)

3. Problem 3

- a. $2C_2H_4(NH_2)_2 + 11O_2 \rightarrow 4CO_2 + 8H_2O + 2NO + 2NO_2$ (1)
- b. $-3135.6 \frac{kJ}{mol}$ (2)
- c. $6.38 * 10^6 \frac{J}{mol \cdot K}$ (1)

Part 2: Gases

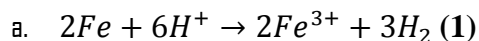
Multiple Choice: (1 point each)

1. D
2. C
3. B
4. A
5. B
6. B
7. C
8. D
9. D
10. B
11. D
12. C
13. C
14. A
15. D
16. D
17. A
18. C
19. A

Short Answer: (All calculations are acceptable to within 10%)

Problems that require use of a previous *calculation* problems' answer to solve may be counted correct even if the previous answer was incorrect as long as it follows the correct steps (not incorrect balanced chemical equations or formulas)

1. Problem 1



b. 0.199 g (1)

c. 5.34×10^{-3} (1)

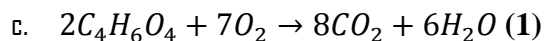
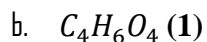
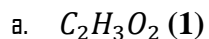
2. Problem 2

a. 1.03 atm (1)

b. $MF_3 - 0.724 \text{ atm}, M - 0.310 \text{ atm}, F_2 - 0.466 \text{ atm}$ (3, 1 each)

c. $K_p - 0.0186, \Delta G - 19.0 \frac{\text{kJ}}{\text{mol}}$ (2, 1 each)

3. Problem 3



d. 101.5 L (2)

e. 215.5 L (2)