Answers

This section includes numerical answers to questions in Chapter and Unit Reviews that require calculation.

Chapter 1 Review, pp. 62–63

17. (a) 20, 20, 22
    (b) 38, 738, 52
    (c) 55, 55, 82
    (d) 26, 26, 33
    (e) 11, 11, 13
24. (c) <48.4 KJ/mol

Unit 1 Review, pp. 150–153

1. (a) 53, 74, 53
   (b) 15, 17, 15
   (c) 29, 35, 29
   (d) 80, 123, 80
3. 62.5 g

Chapter 4 Review, pp. 199–201

2. 24 u
3. 1.5 u
6. 28.11 u
8. (a) 100.09 g/mol
   (b) 92.02 g/mol
   (c) 286.19 g/mol
9. (a) 17.11 mol
   (b) 22.72 mol
   (c) 55.49 mol
10. (a) 48.0 g
    (b) 0.301 g
    (c) 240 kg
11. (a) 2.5×10^{23}
    (b) 4.6×10^{20}
    (c) 3.91×10^{23}
    (d) 1.76×10^{24}
12. (a) 294.34
    (b) 1.2×10^{24}
    (c) 1.3×10^{21}
13. (a) 35.4%
    (b) 52.9%
    (c) 9.1%
15. (a) $C_4H_5N_2O$
    (b) $C_8H_{10}N_4O_2$
16. (a) $C_4H_{14}O$
    (b) $C_8H_8O_2$
17. $C_8H_8O_3$
18. Na 42.1%; P 18.9%; O 39.0%
19. Na 33.2%; As 36.0%; O 30.8%
20. (a) $ZnCl_2$

Chapter 5 Review, pp. 252–253

8. 2.13×10^3 g
9. (a) 6.30 g
   (b) 1.47 g
10. (b) 39.4 g
11. 168 g
12. (c) 23.1 g
    (d) 97.8%
14. (a) 11.8 g
    (b) 70.9 g
    (c) 6.36 g
15. (b) 859.6 g
    (c) 527.9 g
    (d) 937.5 g
16. 3.77 kg

Unit 2 Review, pp. 256–259

1. (a) 2.87 kg
   (b) 73.8 g
   (c) 3.58 g
   (d) 0.115 g
   (e) 66.5 kg
   (f) 4.75 kg
2. (a) 9.73×10^{-2} mol
   (b) 0.186 mol
   (c) 84.2 mol
   (d) 0.832 mol
   (e) 0.100 mol
   (f) 2.98×10^{-4} mol
3. 5.00 g $O_{2(g)}$
4. 3.34 mmol
6. (a) 54.21% Ba, 20.53% Cr, 25.26% O
   (b) 49.54% Co, 10.10% C, 40.36% O
   (c) 20.66% Fe, 39.34% Cl, 4.48% H, 35.51% O
7. (a) 2:3:2:2
   (b) 2:3:2:3
   (c) 2:2:1
9. (a) 8:1:8
   (b) 2:15:12:6
   (c) 2:2:2:1
13. $C_{10}H_{14}N_2$
19. 95.9%
20. (b) 2.32 g
    (c) 8.38 g
21. (b) 3.48 g
    (c) 83.5%
22. $FePO_4 \cdot 4H_2O$
23. (a) 0.138 g
    (b) 0.0190 g
24. (a) 8.42 g
    (b) 11.6 g
25. (a) 146.6 g
    (b) 106.6 g
26. 2.93 g
27. (a) 4.67 g
    (d) 4.29 g

Chapter 6 Review, pp. 309–311

5. 5.0 g
6. 5.9% MF, 51 g; 2.0% MF, 0.15 kg; 1.2% MF, 0.25 kg
7. 0.30 L
8. 11 mg
9. (a) 0.70 mol/L
   (b) 0.125 mol/L
   (c) 2.0 mol/L
   (d) 0.66 mmol/L
10. (c) Na^+, 125 ppm; K^+, 138 ppm
11. 12.6 g
12. 42.8 mL
13. 61 mL
17. (a) 2.82 g
18. (a) 25.0 mL

Chapter 7 Review, pp. 358–359

9. (a) 0.138 L
   (b) about 0.35 L
10. 0.143 mol/L
14. (b) 0.528 mol/L
15. (b) 0.799 mol/L

Chapter 8 Review, pp. 403–405

6. (a) 2.1
   (b) 2.60
7. (a) 2.8×10^{-12}
   (b) 3.2×10^{-4}

10. 10:1
24. (b) 0.140 mol/L
25. (b) 7.31 mol/L

Unit 3 Review, pp. 408–411

13. 89 mg/L; 444 mg/L
14. 8.64 g/100 mL
15. 0.41 g
16. 20.0 mmol/L
17. (a) 75.0 ppm
    (b) 1.87 mmol/L
18. 1.2 L
19. (a) 0.573 mol/L
    (b) 649 g
21. (a) 41.3 mL
    (b) 1.85 L
    (c) 24 mmol/L
    (d) 767 mL
23. 3.5×10^{-11}; 7.2×10^{-4} mol/L; 4.506; 3.144; 1.4×10^{-8}
25. 6.90 L
26. 45.0 g
27. (a) 14 mg
    (b) 48 ppb
28. 0.32 mmol/L
34. (a) 8.1 mL
37. (b) 189 g
    (c) 14.7 times

Chapter 9 Review, pp. 456–457

6. (a) 99.3 kPa
   (b) 0.150 kPa
   (c) 253 kPa
7. (a) 273 K
   (b) 294 K
   (c) 310 K
   (d) 0 K
8. 8.23 L
9. (a) 150 mL
   (b) 135 kPa
10. 317°C
11. 302 kPa
12. (a) 2×10^3 m^3
    (b) 0.11 L
13. 2.53 kL, or 2.53 m^3
14. 6.4 kg
15. 1.03 kmol

Chapter 10 Review, pp. 492–493

3. 250 kPa
4. 96.83 kPa
5. (b) 6.67 L $CO_{2(g)}$, 1.43 L $N_{2(g)}$, 2.38 L $H_2O_{(g)}$
7. 24.8 L $N_{2(g)}$, 49.6 L $H_2O_{(g)}$, 12.4 L $O_{2(g)}$; total = 86.8 L
8. (a) 5.15 mmol
   (b) 162 kPa
   (c) 3.32×10^4 tubes
9. 254 kL, or 254 m^3
10. (a) 5.00×10^2 kL
    (b) 2.23 t
11. 0.11 GL
12. (a) 25.0 mL
    (b) 46.9 mL
    (c) 37.7 mg
13. 80 kPa $N_{2(g)}$, 120 kPa $H_{2(g)}$
15. (b) $V_{C_3H_{8(g)}}$ = 22.0 L/mol
    (c) 1.78%
18. (a) 205 L
19. (a) 798 mL $CO_{2(g)}$, 1.20 L $H_2O_{(g)}$, 399 mL $SO_{2(g)}$

Unit 4 Review, pp. 496–499

5. (a) 0.41 MPa
   (b) 102 kPa
   (c) 45.6 MPa
6. (a) 0.21 mol
   (b) 0.924 mmol
   (c) 3.6 kmol
7. (a) 12.4 kL, or 12.4 m^3
   (b) 1.4 ML
   (c) 1.13 L
8. 170 kL, or 170 m^3
9. 0.33 mol
10. 2.6 kL
11. 8.96 g/L
14. 173 atm
15. 4.73 L
16. 1.2 m^3, or 1.2 kL
18. 97.0 kPa
19. p_{N_2} = 78 kPa, p_{Ar} = 1 kPa
20. (a) 1.00 L $NH_{3(g)}$, 1.25 L $O_{2(g)}$
21. (a) 32.8 L $CO_{2(g)}$, 16.4 L $N_{2(g)}$, 27.3 L $H_2O_{(g)}$, 2.73 L $O_{2(g)}$
    (c) 17.1 MPa
22. 2.7×10^2 kg
23. V = 1.19 L/mol
24. (a) 50 mL
    (b) reaction 1, 6 mol; reaction 2, 4 mol
    (c) 0.56 L
    (d) 2.1 L
25. (c) 9.90 mmol
    (d) 162 mL
26. M = 101 g/mol
27. (a) 29.1 mmol
    (b) Yield $CO_{2(g)}$ = 96.4%
28. (a) Yield $H_{2(g)}$ = 84%
30. (a) 5.54 GL $CO_{2(g)}$; 1.39 GL $H_2O_{(g)}$; 2.77 GL $NO_{2(g)}$

Chapter 12 Review, pp. 596–597

5. 988 kJ
6. 38.5°C
11. 414 g
12. 939 g
13. 37.7 kJ/g
15. (a) 373 kJ/mol
    (b) 6.21 MJ
17. (a) average 47.3 kJ/g
    (c) 6.74 MJ/mol
18. (a) 276 J/g; 171 J/g; 95 J/g
19. (a) 39.0 kJ/mol
21. (a) 2.0 MJ

Unit 5 Review, pp. 600–603

20. (a) 1.429 MJ/mol; 1.323 MJ/mol; 1.258 MJ/mol
21. (a) 400 kJ/mol
    (b) 133 kJ/mol
    (c) 33.3 kJ
22. 64.5 kJ/mol
23. (c) 1.41 MJ
24. 21 g
25. 286 kJ/mol
26. 25.6°C
29. (a) 19.9 kJ/g; 27.7 kJ/g
    (b) 638 kJ/mol; 1.28 MJ/mol
31. (a) 5.7 GJ
    (b) $50