



DPP-2 [First law of Thermodynamics]

Cry if you must. But then wipe your tears, take a deep breath, and walk again—toward your goal.

- When 1 mol of ideal gas expands from 1 L to 5 L against a constant pressure of 1 atm, the work done is:**
 - +4 L·atm
 - 4 L·atm
 - 0
 - +2 L·atm
- A system gives out 20 J of heat and does 40 J of work. What is the internal energy change?**
 - +60 J
 - 20 J
 - 60 J
 - +40 J
- 10 mol of O_2 at 27°C is contained in a 5 L cylinder. All the gas escapes into the atmosphere (1 atm). Calculate the work done by the gas. ($R = 0.083 \text{ L}\cdot\text{atm mol}^{-1}\text{K}^{-1}$)**
 - 244 L·atm
 - 200 L·atm
 - 100 L·atm
 - 300 L·atm
- A gas occupies 2 L at STP. It is provided 300 J of heat so that its volume becomes 2.5 L at 1 atm. Calculate the change in internal energy.**
 - 200 J
 - 249.35 J
 - 300 J
 - 150 J
- 1 g of water changes into vapour at constant pressure (1 atm). The volume increases from 1 mL to 1671 mL. Heat absorbed = 540 cal. Find the increase in internal energy.**
 - 1000 J
 - 1500 J
 - 2099.33 J
 - 2268 J
- A sample of gas expands from 2 L to 12 L against 1 atm. It absorbs 600 J heat. Calculate ΔE .**
 - 413 J
 - 213 J
 - +200 J
 - 1013 J
- Two moles of an ideal gas at 2 atm and 27°C are compressed isothermally to half its volume by an external pressure of 4 atm. Calculate work done (in J). ($R = 0.082 \text{ L}\cdot\text{atm mol}^{-1}\text{K}^{-1}$)**
 - 4984 J
 - 4000 J
 - 2500 J
 - 3000 J

8. **An insulated container has gas in one half and vacuum in the other half. When the partition is removed, what are the changes?**
- $\Delta E = 0, \Delta T = 0$
 - $\Delta E = +Q, \Delta T = +10 \text{ K}$
 - $\Delta E = -Q, \Delta T = -10 \text{ K}$
 - $\Delta E = +20 \text{ J}, \Delta T = -5 \text{ K}$
9. **1 mol of ideal gas in a 2 L bulb at 1 atm enters an evacuated 10 L bulb. Also, the gas expands from 1 L to 5 L against 1 atm. Find work done.**
- 0, -405.2 J
 - 100 J, -300 J
 - 200 J, -600 J
 - +50 J, 0
10. **$q = -w$ is not true for:**
- Isothermal process
 - Adiabatic process
 - Cyclic process
 - 1 and 3 both
11. **If work done by the system is 300 J when 100 cal heat is supplied to it, the change in internal energy is:**
- 200 J
 - 400 J
 - 720 J
 - 120 J
12. **A system has E_i , 450 J heat is taken out and 600 J work is done. The final energy is:**
- $(E_i + 150)$
 - $(E_i + 1050)$
 - $(E_i - 150)$
 - None of these
13. **The work done by system = 8 J when 40 J heat is supplied. ΔE is:**
- 32 J
 - 20 J
 - 48 J
 - 32 J
14. **A gas absorbs 100 J heat and expands by 500 cm^3 against $2 \times 10^5 \text{ N/m}^2$. $\Delta E = ?$**
- 300 J
 - 100 J
 - +100 J
 - None
15. **1 mol of gas occupying 3 dm^3 expands at 1 atm to 13 L. Work done is:**
- 10 atm·dm³
 - 20 atm·dm³
 - 39 atm·dm³
 - 48 atm·dm³
16. **3 mol ideal gas expands spontaneously in vacuum. Work = ?**
- 3 J
 - 9 J
 - 0
 - Infinite

17. **If 400 kJ work done and 150 kJ heat given, what is ΔE ?**
 (a) +250 kJ
 (b) -250 kJ
 (c) +600 kJ
 (d) -600 kJ
18. **First law of thermodynamics states:**
 (a) $\Delta E = q - w$
 (b) $\Delta U = q + w$
 (c) $\Delta U = q - w$
 (d) $\Delta U = q - \Delta H$
19. **An ideal gas expanded against 42 Pa through 10 m³. If 350 J heat given, find ΔU :**
 (a) -50 J
 (b) -70 J
 (c) +50 J
 (d) +70 J
20. **Work done is zero for:**
 (a) Isobaric
 (b) Adiabatic
 (c) Isochoric
 (d) Cyclic
21. **System absorbs 10 kJ heat, does 4 kJ work. ΔU is:**
 (a) -6 kJ
 (b) +6 kJ
 (c) -14 kJ
 (d) +14 kJ
22. **Volume expands by 0.25 m³ at 10³ N/m². Work = ?**
 (a) 2.5 erg
 (b) 250 J
 (c) 250 eV
 (d) 250 cal
23. **1 mol gas heated at constant volume from 298 K to 308 K with 500 J heat. Correct statement:**
 (a) $q = \Delta U = -500, w = 0$
 (b) $q = \Delta U = +500, w = 0$
 (c) $q = w = 500, \Delta U = 0$
 (d) $\Delta U = 0, q = w = -500$
24. **In closed insulated vessel stirred with paddle, what is true?**
 (a) $\Delta E = W \neq 0, q = 0$
 (b) $\Delta E = W, q \neq 0$
 (c) $\Delta E = 0, W \neq 0$
 (d) $W = 0, \Delta E = q \neq 0$
25. **Work during expansion 4 dm³ to 6 dm³ against 3 atm. (1 L atm=101.32 J)**
 (a) -6 J
 (b) -608 J
 (c) +304 J
 (d) -304 J
26. **When an ideal gas undergoing expansion in vacuum shows**
 (a) $\Delta U = 0$
 (b) $w = 0$

- (c) $q = 0$
(d) All
27. **In thermodynamics a process is called reversible when**
(a) System and surrounding change into each other
(b) There is no boundary between system and surrounding
(c) The surroundings are always in equilibrium with the system
(d) The system changes into the surroundings spontaneously
28. **16 kg O_2 expands isobarically at STP to double volume. Work is nearly:**
(a) 260 cal
(b) 180 cal
(c) 130 cal
(d) 271 cal
29. **At 300 K, 112 g Fe reacts with HCl to form $FeCl_2$. Work done is nearly:**
(a) 1.1 kcal
(b) 0.6 kcal
(c) 0.3 kcal
(d) 0.2 kcal
30. **System absorbs 300 cal, volume doubles, T doubles (273 to 546 K), work=200 cal. ΔE ?**
(a) 273 cal
(b) 500 cal
(c) 100 cal
(d) -500 cal
31. **1 mol gas at 300 K expanded isothermally from 1 L to 10 L. ΔE is:**
(a) 163.7 cal
(b) 1381.1 cal
(c) 9 L·atm
(d) 0
32. **Adiabatic process: which is true?**
(a) $q = w$
(b) $-\Delta E = -w$
(c) $P\Delta V = 0$
(d) $q = \Delta E$
33. **Isochoric process, ΔE is:**
(a) Equal to heat absorbed
(b) Equal to heat evolved
(c) Equal to work
(d) Zero
34. **1 mol gas occupying 3 L expands at 1 atm to 15 L. Work is:**
(a) -1.215×10^3 J
(b) $+1.215 \times 10^3$ J
(c) $+121.5 \times 10^3$ J
(d) $+1.215 \times 10^1$ J
35. **Work during expansion from 14 dm³ to 16 dm³ against 5 atm:**
(a) -405.2 J
(b) +304 J
(c) -304 J
(d) -6 J

1. B
2. C
3. A
4. B
5. C
6. A
7. A
8. A
9. A
10. B

11. D
12. C
13. A
14. B
15. C
16. B
17. C
18. C
19. B
20. A

21. A
22. B
23. B
24. D
25. B
26. A
27. A
28. A
29. B
30. A

31. B
32. B
33. D
34. A
35. B
36. A
37. A