A R Assertion & Reason

For AIIMS Aspirants

Read the assertion and reason carefully to mark the correct option out of the options given below:

(a) If both assertion and reason are true and the reason is the correct explanation of the assertion.
(b) If both assertion and reason are true but reason is not the correct explanation of the assertion.
(c) If assertion is true but reason is false.
(d) If the assertion and reason both are false.
(e) If assertion is false but reason is true.

1. Assertion : In pressure-temperature (P-T) phase diagram of water, the slope of the melting curve is found to be negative.
Reason : Ice contracts on melting to water. **[AIIMS 2005]**

2. Assertion : For gas atom the number of degrees of freedom is 3.
Reason : $\frac{C_P}{C_V} = \gamma$ **[AIIMS 2000]**

3. Assertion : A gas have a unique value of specific heat.
Reason : Specific heat is defined as the amount of heat required to raise the temperature of unit mass of the substance through unit degree.

4. Assertion : A gas can be liquified at any temperature by increase of pressure alone.
Reason : On increasing pressure the temperature of gas decreases.

5. Assertion : Equal masses of helium and oxygen gases are given equal quantities of heat. There will be a greater rise in the temperature of helium compared to that of oxygen.
Reason : The molecular weight of oxygen is more than the molecular weight of helium.

6. Assertion : Absolute zero is the temperature corresponding to zero energy.
Reason : The temperature at which no molecular motion cease is called absolute zero temperature.

7. Assertion : The ratio of specific heat gas at constant pressure and specific heat at constant volume for a diatomic gas is more than that for a monatomic gas.
Reason : The molecules of a monatomic gas have more degree of freedom than those of a diatomic gas.

8. Assertion : At room temperature, water does not sublimate from water to steam.
Reason : The critical point of water is much above the room temperature.

9. Assertion : Specific heat of a gas at constant pressure (C_P) is greater than its specific heat at constant volume (C_V).
Reason : At constant pressure, some heat is spent in expansion of the gas.

10. Assertion : The internal energy of a real gas is function of both, temperature and volume.
Reason : Internal kinetic energy depends on temperature and internal potential energy depends on volume.

11. Assertion : For an ideal gas, at constant temperature, the product of the pressure and volume is constant.
Reason : The mean square velocity of the molecules is inversely proportional to mass. **[AIIMS 1998]**

12. Assertion : If a gas container in motion is suddenly stopped, the temperature of the gas rises.
Reason : The kinetic energy of ordered mechanical motion is converted in to the kinetic energy of random motion of gas molecules.

13. Assertion : Internal energy of an ideal gas does not depend upon volume of the gas

Reason : Internal energy of ideal gas depends on temperature of gas.

14. Assertion : At low density, variables of gases P, V and T follows the equation $PV = \mu RT$

Reason : At low density real gases are more closely to ideal gases

15. Assertion : Maxwell speed distribution graph is symmetric about most probable speed

Reason : *rms* speed of ideal gas, depends upon it's type (monoatomic, diatomic and polyatomic)

Answers

Gas Laws

1	c	2	b	3	a	4	b	5	c
6	c	7	c	8	c	9	a	10	d
11	a	12	d	13	b	14	d	15	c
16	b	17	c	18	a	19	a	20	d
21	c	22	b	23	a	24	a	25	a
26	a	27	c	28	a	29	c	30	c
31	d	32	c	33	a	34	d	35	a
36	a	37	c	38	a	39	a	40	c
41	d	42	b	43	a	44	c	45	a
46	a	47	d	48	d	49	c	50	d
51	c	52	c	53	c	54	b	55	d
56	c	57	c	58	a	59	d	60	a
61	d	62	c	63	d	64	d	65	c
66	b	67	a	68	d	69	d	70	c
71	c	72	c	73	d	74	b	75	c
76	c	77	c	78	a	79	c	80	c
81	b	82	a	83	c	84	b	85	c
86	d	87	c	88	c	89	b	90	a
91	b	92	a	93	a	94	d	95	a
96	c	97	a	98	a	99	c	100	c

Speed of Gas

1	b	2	a	3	c	4	c	5	a
6	a	7	d	8	d	9	a	10	a
11	c	12	d	13	b	14	c	15	a
16	a	17	a	18	d	19	c	20	a
21	d	22	c	23	c	24	a	25	d
26	a	27	b	28	d	29	a	30	b
31	c	32	b	33	d	34	c	35	a
36	b	37	a	38	c	39	d	40	a
41	d	42	a	43	c	44	b	45	b
46	c	47	c	48	b	49	b	50	a
51	b	52	b	53	b	54	d	55	a
56	a	57	c	58	b	59	d	60	a
61	c	62	b	63	b	64	d	65	a
66	b	67	b	68	a				

Degree of Freedom and Specific Heat

1	a	2	c	3	a	4	a	5	c
6	d	7	c	8	b	9	d	10	d
11	c	12	a	13	b	14	d	15	a
16	a	17	a	18	a	19	b	20	a
21	c	22	b	23	c	24	d	25	b
26	d	27	d	28	a	29	b	30	d
31	a	32	c	33	a	34	c	35	a
36	d	37	a	38	a	39	b	40	c
41	b	42	b	43	b	44	d	45	b
46	c	47	c	48	d				

Pressure and Energy

1	c	2	b	3	c	4	d	5	d
6	d	7	d	8	a	9	a	10	b
11	d	12	c	13	c	14	a	15	d
16	d	17	b	18	b	19	c	20	a
21	c	22	b	23	b	24	c	25	a
26	b	27	d	28	d	29	c	30	d
31	a	32	a	33	c	34	c	35	d
36	c	37	a	38	b	39	ac	40	d
41	d	42	b	43	a	44	a	45	a
46	b	47	a	48	a	49	d	50	a
51	c	52	c	53	d	54	c	55	b
56	c	57	d	58	d	59	c	60	c
61	a	62	c	63	c	64	a		

Critical Thinking Questions

1	d	2	d	3	a	4	b	5	a
6	acd	7	b	8	b	9	cd	10	b
11	b	12	bc	13	d	14	d	15	a
16	c	17	d	18	b	19	d	20	d
21	a	22	c	23	b	24	a	25	c
26	c	27	c	28	c	29	d	30	d
31	d	32	b	33	a	34	a	35	d

36	c	37	c	38	d				

Graphical Questions

1	d	2	b	3	c	4	c	5	c
6	c	7	a	8	b	9	a	10	c
11	b	12	c	13	c	14	a	15	b
16	b	17	a	18	a	19	b	20	c
21	a	22	c	23	b	24	b	25	a

Assertion and Reason

1	a	2	b	3	e	4	d	5	b
6	e	7	d	8	a	9	a	10	a
11	b	12	a	13	b	14	a	15	d

AS Answers and Solutions

Gas Laws

1. (c) Using Charle's law $\frac{P_1}{P_2} = \frac{T_1}{T_2}$

or $P_2 = \frac{P_1 T_2}{T_1} = \frac{P(273+927)}{(273+27)} = 4P.$

2. (b) $\frac{V_1}{V_2} = \frac{T_1}{T_2} \Rightarrow T_2 = 2 \times T_1 = 2 \times (273+0) = 546K$

$\Rightarrow T_2 = 273 \times 2 = 546K \Rightarrow 273°C \Rightarrow 273°C$