

#### Max. Marks: 200

Date: 29.08.2022

## JB 2 KVL BATCH PHYSICS : PART TEST Topic: Projectile Motion + Relative Motion

- 1. A river is flowing from east to west at a speed of 5 m/min. A man on south bank of river, capable of swimming 10 m/min in still water, wants to swim across the river in shortest time. He should swim
  - (a) Due north (b) Due north-east
  - (c) Due north-east with double the speed of river (d) None of these
- 2. A person aiming to reach the exactly opposite point on the bank of a stream is swimming with a speed of 0.5 m/s at an angle of 120° with the direction of flow of water. The speed of water in the stream is
  - (a) 1 m/s (b) 0.5 m/s (c) 0.25 m/s (d) 0.433 m/s
- 3. A boat crosses a river with a velocity of 8 km/h. If the resulting velocity of boat is 10 km/h then the velocity of river water is
  - (a) 4 km/h (b) 6 km/h (c) 8 km/h (d) 10 km/h
- 4. A man sitting in a bus travelling in a direction from wet to east with a speed of 40 km/h observes that the rain drops are falling vertically down. To the another man standing on ground the rain will appear
  - (a) To fall vertically down
  - (b) To fall at an angle going from west to east
  - (c) To fall at an angle going from east to west
  - (d) The information given is insufficient to decide the direction of rain



- 5. A boat is rowed across a river at the rate of 4.5 km/hr. The river flows at the rate of 6 km/hr. The velocity of boat in m/s is:
  - (a) 3.1 (b) 2.1 (c) 2.9 (d) 5
- 6. A swimmer crosses the river along the line making an angle of 45° with the direction of flow. Velocity of the river water is 5 m/s. Swimmer takes 12 seconds to cross the river of width 60 m. The velocity of the swimmer with respect to water will be:
  - (a) 10 m/s (b) 5 m/s (c)  $5\sqrt{5}$  m/s (d)  $5\sqrt{2}$  m/s
- 7. A jet airplane travelling from east to west at a speed of 500 km  $h^{-1}$  ejected out gases of combustion at a speed of 1500 km  $h^{-1}$  with respect to the jet plane. What is the velocity of the gases with respect to an observer on the ground?
  - (a)  $1000 \text{ km } \text{h}^{-1}$  in the direction west to east (b)  $1000 \text{ km } \text{h}^{-1}$  in the direction east to west
  - (c)  $2000 \text{ km } \text{h}^{-1}$  in the direction west to east (d)  $2000 \text{ km } \text{h}^{-1}$  in the direction east to west
- 8. Rain is falling vertically with a velocity of 3 kmh<sup>-1</sup>. A man walks in the rain with a velocity of 4 kmh<sup>-1</sup>. The rain drops will fall on the man with a velocity of
  - (a)  $5 \text{ kmh}^{-1}$  (b)  $4 \text{ kmh}^{-1}$  (c)  $3 \text{ kmh}^{-1}$  (d)  $1 \text{ kmh}^{-1}$
- 9. A man who can swim at the rate of 2 km/hr (in still river) crosses a river to a point exactly opposite on the other bank by swimming in a direction of 120° to the flow of the water in the river. The velocity of the water current in km/hr is
  - (a) 1 (b) 2 (c) 1/2 (d) 3/2
- 10. A particle is projected from a point (0, 1) on Y-axis (assume + Y direction vertically upwards) aiming towards a point (4, 9). It fell on ground along x axis in 1 sec. Taking  $g = 10 \text{ m/s}^2$  and all coordinate in metres. Find the X-coordinate where it fell.
  - (a) (3,0) (b) (4,0) (c) (2,0) (d)  $(2\sqrt{5},0)$



11. A particle is projected from the horizontal x-z plane, in vertical x-y plane where x-axis is horizontal and positive y-axis vertically upwards. The graph of 'y' coordinate of the particle v/s time is as shown. The range of the particle is  $\sqrt{3}$ . Then the speed of the projected particle is



- 12. A particle at a height 'h' from the ground is projected with an angle 30° from the horizontal, it strikes the ground making angle 45° with horizontal. It is again projected from the same point with same speed but with an angle of 60° with horizontal,. Find the angle it makes with the horizontal when it strikes the ground:
  - (a)  $\tan^{-1}(4)$  (b)  $\tan^{-1}(5)$  (c)  $\tan^{-1}(\sqrt{5})$  (d)  $\tan^{-1}(\sqrt{3})$
- 13. Identify the correct statement related to the projectile motion
  - (a) It is uniformly accelerated everywhere
  - (b) It is uniformly accelerated everywhere except at the highest position where it is moving with constant velocity
  - (c) Acceleration is never perpendicular to velocity
  - (d) None of the above
- 14. A ball is projected with a velocity 20 ms<sup>-1</sup> at an angle to the horizontal. In order to have the maximum range. Its velocity at the highest position must be
  - (a)  $10 \text{ ms}^{-1}$  (b)  $14 \text{ ms}^{-1}$  (c)  $18 \text{ ms}^{-1}$  (d)  $16 \text{ ms}^{-1}$





- (a) 1:1 (b)  $\sin \theta : \cos \theta$  (c)  $\sin^2 \theta : \cos^2 \theta$  (d)  $\cos \theta : \sin \theta$
- 16. A gun is firing bullets with velocity  $v_0$  by rotating through  $360^\circ$  in the horizontal plane. The maximum area covered by the bullets is
  - (a)  $\frac{\pi v_0^2}{g}$  (b)  $\frac{\pi^2 v_0^2}{g}$  (c)  $\frac{\pi v_0^4}{g}$  (d)  $\frac{\pi^2 v_0^4}{g}$
- 17. A body is projected at an angle  $60^{\circ}$  with the horizontal with kinetic energy K. When the velocity makes an angle  $30^{\circ}$  with the horizontal, the kinetic energy of the body will be
  - (a) K/2 (b) K/3 (c) 2K/3 (d) 3K/4
- 18. The range of a projectile at an angle  $\theta$  is equal to half of the maximum range if thrown at the same speed. The angle of projection  $\theta$  is given by
  - (a)  $15^{\circ}$  (b)  $30^{\circ}$  (c)  $60^{\circ}$  (d) data insufficient
- 19. If  $T_1$  and  $T_2$  are the time of flight for two complementary angles, then the range of projectile R is given by
  - (a)  $R = 4gT_1T_2$  (b)  $R = 2gT_1T_2$  (c)  $R = \frac{1}{4}gT_1T_2$  (d)  $R = \frac{1}{2}gT_1T_2$
- 20. A grass hopper can jump maximum distance 1.6 m. It spends negligible time on ground. How far can it go in  $10\sqrt{2}$  s?
  - (a) 45 m (b) 30 m (c) 20 m (d) 40 m



- 21. A train is moving on a track at 30 ms<sup>-1</sup>. A ball is thrown from it perpendicular to the direction of motion at  $30 \text{ ms}^{-1}$  at  $45^{\circ}$  from horizontal. Find the distance of ball from the point of projection on train to the point where it strikes the ground.
  - (a) 90 m (b)  $90\sqrt{3}$  m (c) 60 m (d)  $60\sqrt{3}$  m
- 22. A body is projected at time t = 0 from a certain point on a planet's surface with a certain velocity at a certain angle with the planet's surface (assumed horizontal). The horizontal and vertical displacements x and y (in metre) respectively vary with time t in second as,  $x = (10\sqrt{3})t$  and  $y = 10t t^2$ . The maximum height attained by the body is
  - (a) 200 m (b) 100 m (c) 50 m (d) 25 m
- 23. A particle is fired horizontally from an inclined plane of inclination 30° with horizontal with speed 50 ms<sup>-1</sup>. If  $g = 10 \text{ ms}^{-2}$ , the range measured along the incline is
  - (a) 500 m (b)  $\frac{1000}{3}$  m (c)  $200\sqrt{2}$  m (d)  $100\sqrt{3}$  m

24. Two stones are projected with the same speed but making different angles with the horizontal. Their horizontal ranges are equal. The angle of projection of one is  $\frac{\pi}{3}$  and the maximum height reached by it is 102 m. Then the maximum height reached by the other in metres is

- (a) 336 (b) 224 (c) 56 (d) 34
- 25. A ball is projected upwards from the top of a tower with a velocity 50 ms<sup>-1</sup> making an angle 30° with the horizontal. The height of tower is 70 m. After how many seconds from the instant of throwing, will the ball reach the ground. (g = 10 ms<sup>-2</sup>)
  - (a) 2 s (b) 5 s (c) 7 s (d) 9 s





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## JB 2 KVL BATCH CHEMISTRY: PART TEST Topic: Periodic Properties + Mole Concept

26.	An organic compound contains 49.3% carbon, 6.84 % hydrogen and its vapour density is 73. Molecular formul of the compound is										
	(a)	$C_3H_8O_2$	(b)	$C_{3}H_{10}O_{2}$	(c)	C <sub>6</sub> H <sub>9</sub> O	(d)	$C_{6}H_{10}O_{4}$			
27.	Two form	oxides of a metal output of 2 <sup>nd</sup> oxide will	contain 5 be	50% and 40% of me	etal M res	spectively. If the fo	ormula of a	first oxide is MO, the			
	(a)	$MO_2$	(b)	$M_2O_3$	(c)	$M_2O$	(d)	$M_2O_5$			
28.	The mass of carbon anode consumed (giving only carbon dioxide) in the production of 270 kg of Al metal from										
	bauxi	ite by Hall process	s :								
	(a)	270 kg	(b)	540 kg	(c)	90 kg	(d)	180 kg			
29.	Sulphur trioxide is prepared by the following two reactions.										
	$S_8(s) + 8O_2(g) \rightarrow 8SO_2(g)$										
	$2SO_2$	$(g) + O_2(g) \rightarrow 2SO$	3(g)								
	How	many grams of SO	3 are pro	duced from 1 mole S	$S_8?$						
	(a)	1280	(b)	640	(c)	960	(d)	320			
30.	Which pair of the following substances is said to be isomorphous?										
	(a)	White vitriol and	l blue vi	triol	(b)	Epsom salt and Glauber's salt					
	(c)	Blue vitriol and	Glauber	's salt	(d) White vitriol and Epsom salt.						
31.	The total number of protons in 10g of calcium carbonate is :										
	(a)	$3.0115\times10^{24}$	(b)	$1.5057\times10^{24}$	(c)	$2.0478\times10^{24}$	(d)	$4.0956  imes 10^{24}$			
				Space for R	ough Wo	<u>rk</u>					



32.	Total number of atoms represented by the compound CuSO <sub>4</sub> . 5H <sub>2</sub> Ois :											
	(a)	27	(b)	21	(c)	5	(d)	8				
33.	The equivalent weight of phosphoric acid $H_3PO_4$ in the reaction. NaOH + $H_3PO_4 \rightarrow NaH_2PO_4 + H_2O_1$ is :											
	(a)	59	(b)	49	(c)	25	(d)	98				
34.	Which	n of the following ha	as least o	oxidation state of Fe	?							
	(a)	$K_3[Fe(OH)_6]$			(b)	$K_2[FeO_4]$						
	(c)	FeSO <sub>4</sub> . (NH <sub>4</sub> ) <sub>2</sub> SO	4.6H2O		(d)	$[Fe(CN)6]^{3-}$						
35.	Oxidation state of carbon in HCOOH will be :											
	(a)	+1	(b)	+2	(c)	-4	(d)	0				
$\begin{array}{c} 32. & 10 \\ (a) \\ 33. & Th \\ Na \\ (a) \\ 34. & W \\ (a) \\ (c) \\ 35. & Oz \\ (a) \\ (c) \\ 35. & Oz \\ (c) \\$	Which	Which one of the following reactions is a redox reaction ?										
	(a)	$CuSO_4 + 4NH_3 \rightarrow$	Final Culls	$[H_3)_4]SO_4$	(b)	$Na_2SO_4 + BaCl_2 \rightarrow BaSO_4 + 2NaCl$						
<ul><li>34.</li><li>35.</li><li>36.</li><li>37.</li><li>38.</li></ul>	(c)	$SO_2 + H_2O \rightarrow H_2S$	SO <sub>3</sub>		(d)	$2CuSO_4 + 4KI \rightarrow Cu_2I_2 + 2K_2SO_4 + I_2$						
<ul> <li>32. T</li> <li>33. T</li> <li>33. T</li> <li>N</li> <li>(2</li> <li>34. W</li> <li>(2</li> <li>35. C)</li> <li>(2</li> <li>36. W</li> <li>(2</li> <li>(2&lt;</li></ul>	In the	In the reaction, $2Na_2S_2O_3 + I_2 = Na_2S_4O_6 + 2 NaI$ , $I_2$ acts as :										
	(a)	reducing agent			(b)	oxidising agent						
	(c)	oxidising as well	as reduc	ing agent	(d)	none						
<ul> <li>32.</li> <li>33.</li> <li>34.</li> <li>35.</li> <li>36.</li> <li>37.</li> <li>38.</li> <li>39.</li> </ul>	In the	following reaction										
	$3Br_2 + 6CO_3^2 + 3H_2O = 5Br^- + BrO_3^- + 6HCO_3^-$											
	(a) bromine is oxidised, carbonate is reduced.				(b)	bromine is reduced	l, carbon	ate is oxidised				
	(c)	bromine is neither	r reduce	d nor oxidised	(d)	bromine is reduced	l as well	as oxidised				
39.	In whi	ch the following rea	actions r	no change in valency	occurs?							
	(a)	$SO_2 + 2H_2S \rightarrow 3S_2$	$S + 2H_2 C$	)	(b)	$2Na + O_2 \rightarrow Na_2O_2$	2					
	(c)	$Cl_2 + 2NaOH \rightarrow 1$	NaClO -	+ NaCl $+$ H <sub>2</sub> O	(d)	$AgNO_3 + KCl \rightarrow AgCl + KNO_3$						



 $Learning \ with \ the \ Speed \ of \ Mumbai \ and \ the \ Tradition \ of \ Kota$ 

40. For the redox reaction,

 $MN\textit{O}_4^- + C_2\textit{O}_4^{2-} + + H^+ \rightarrow MN^{2+} + CO_2 + H_2O$ 

the correct coefficients of the reactants for the balanced equation are :

		$MNO_4^-$		$C_2 O_4^{2-}$		$\mathrm{H}^{\scriptscriptstyle +}$					
	(a)	2		5		16					
	(b)	16		5		2					
	(c)	5		16		2					
	(d)	2		16		5					
41.	The oxidation state of iodine in $H_4IO_6^-$ is :										
	(a)	+7	(b)	-1	(c)	+5	(d)	+1			
42.	A compound contains atoms A, B and C. The oxidation number of A is +2, of B is +5 and of C is -2. The possible formula of the compound is :										
	(a)	$ABC_2$	(b)	$B_2(AC_3)_2$	(c)	$A_3(BC_4)_2$	(d)	$A_3(B_4C)_2$			
43.	All the s-block elements of the periodic table are placed in the groups										
	(a)	IA and IIA	(b)	IIIA and IV A	(c)	Bgroups	(d)	VA and VII A			
44.	The set representing the correct order of first ionisation potential is										
	(a)	K > Na > Li	(b)	Be > Mg > Ca	(c)	B > C > N	(d)	Ge > Si > C			
45.	The c	orrect order of radi	ii is								
	(a)	N < Be < B	(b)	$F^- < O^2 < N^{3-}$	(c)	Na < Li < K	(d)	${\rm Fe}^{3+} < {\rm Fe}^{2+} < {\rm Fe}^{4+}$			
46.	The i	onisation enthalpy	of $X^+$ ion	is equal to							
	(a)	the electron gain	y of X atom	(b)	the electronegati	atom					
	(c)	the ionisation er	nthalpy of	X atom	(d)	none of the above					



- 47. The first ionisation energy of oxygen is less than that of nitrogen. Which of the following is the correct reason for this observation?
  - (a) lesser effective nuclear charge of oxygen than nitrogen
  - (b) lesser atomic size of oxygen than nitrogen.
  - (c) Greater inter-electron repulsion between two electrons in the same p-orbital counter balances the increase in effective nuclear charge on moving from nitrogen to oxygen.
  - (d) Greater effective nuclear charge of oxygen than nitrogen.
- 48. Identify the wrong statement in the following:
  - (a) Amongest isoelectronic species, smaller the positive charge on the cation, smaller is the ionic radius.
  - (b) Amongst isoelectronic species, greater the negative charge on the anion, larger is the ionic radius.
  - (c) Atomic radius of the elements increases as one moves down the first group of the periodic table.
  - (d) Atomic radius of the elements decreases as one moves across from left to right in the 2<sup>nd</sup> period of the periodic table.
- 49. Which of the following is correct?
  - (a) Radius of  $Ca^{2+} < Cl < S^{2-}$  (b) Radius of  $Cl^- < S^{2-} < Ca^{2+}$
  - (c) Radius of  $S^{2-} = Cl^{-} = Ca^{2+}$  (d) Radius of  $S^{2-} < Cl^{-} < Ca^{2+}$
- 50. The correct order of electronegativities of N, O, F and P is
  - (a) F > N > P > O (b) F > O > P > N (c) F > O > N > P (d) N > O > F > P

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# JB 2 KVL BATCH PHYSICS : PART TEST ANSWER KEY Topic: Projectile Motion + Relative Motion

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

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## JB 2 KVL BATCH CHEMISTRY: PART TEST ANSWER KEY Topic: Periodic Properties + Mole Concept

26.	(d)	27.	(b)	28.	(c)	29.	(b)	30.	(d)
31.	(a)	32.	(b)	33.	(d)	34.	(c)	35.	(b)
36.	(d)	37.	(b)	38.	(d)	39.	(d)	40.	(a)
41.	(a)	42.	(c)	43.	(a)	44.	(b)	45.	(b)
46.	(d)	47.	(c)	48.	(a)	49.	(a)	50.	(c)