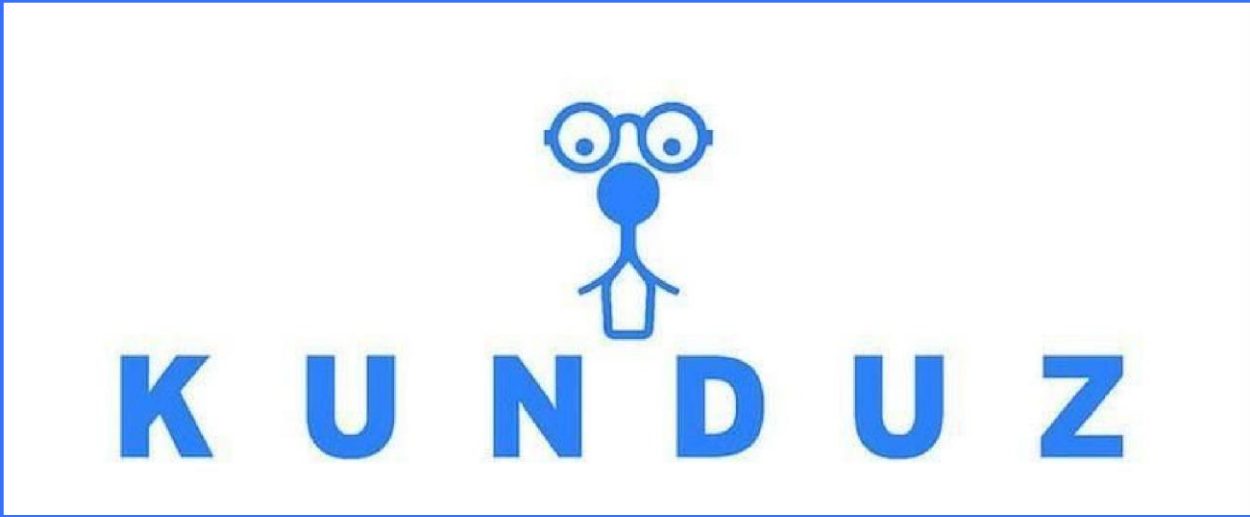


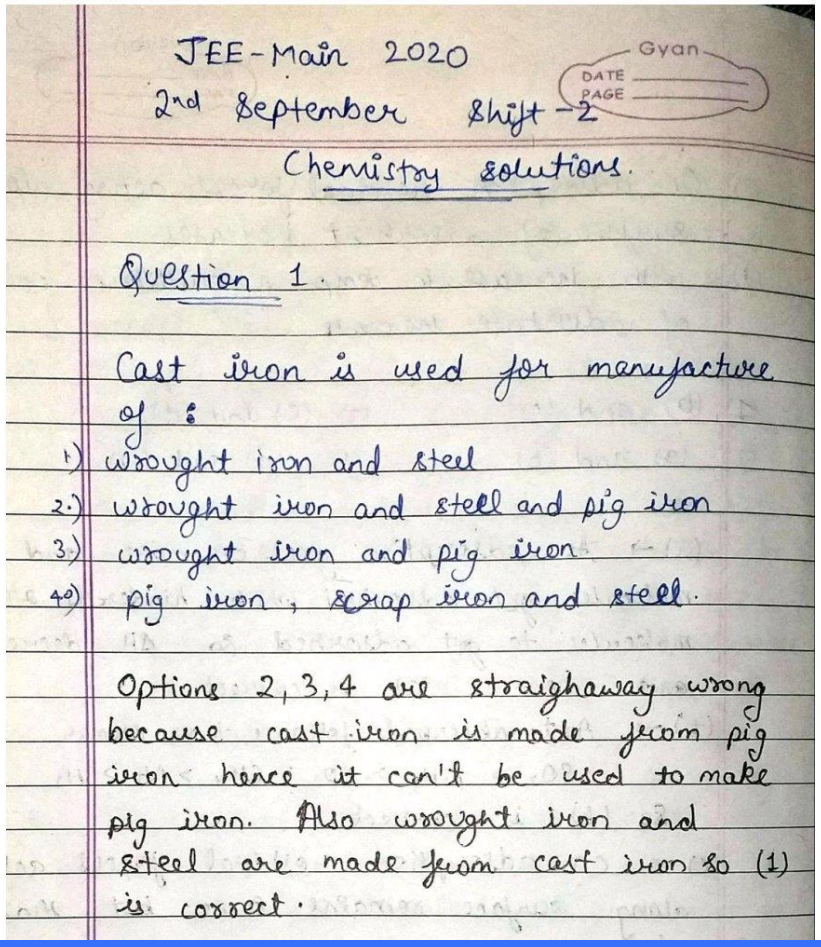
JEE Mains 2nd September 2020 shift 2 Chemistry solutions prepared by KUNDUZ tutors

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Question number

Question and Answers

1



JEE-Main 2020
2nd September Shift-2
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Chemistry solutions.

Question 1.

Cast iron is used for manufacture of :

1) wrought iron and steel
2.) wrought iron and steel and pig iron
3.) wrought iron and pig iron
4.) pig iron, scrap iron and steel.

Options 2, 3, 4 are straighaway wrong because cast iron is made from pig iron hence it can't be used to make pig iron. Also wrought iron and steel are made from cast iron so (1) is correct.

2

Question 2.

Which statements regarding adsorption are valid

(a) ΔH becomes less -ve as adsorption proceeds.

(b) On given adsobent, ammonia is adsorbed more than N_2 gas.

(c) On adsorption residual forces acting along the surface of adsorbent increases

(d) With increase in temp., equillibrium concentration of adsorbate increase.

(1) (b) and (c) (2) (c) and (d)

(3) (a) and (b) (4) (d) and (a)

(a) → As adsorption goes on more and more molecules get adsorbed which hinderds other molecules to get adsorbed so ΔH decreases hence (a) is correct.

(b) → Amt. absorbed follows the order

$SO_2 > NH_3 > CO_2 > CH_4 > N_2 > H_2$

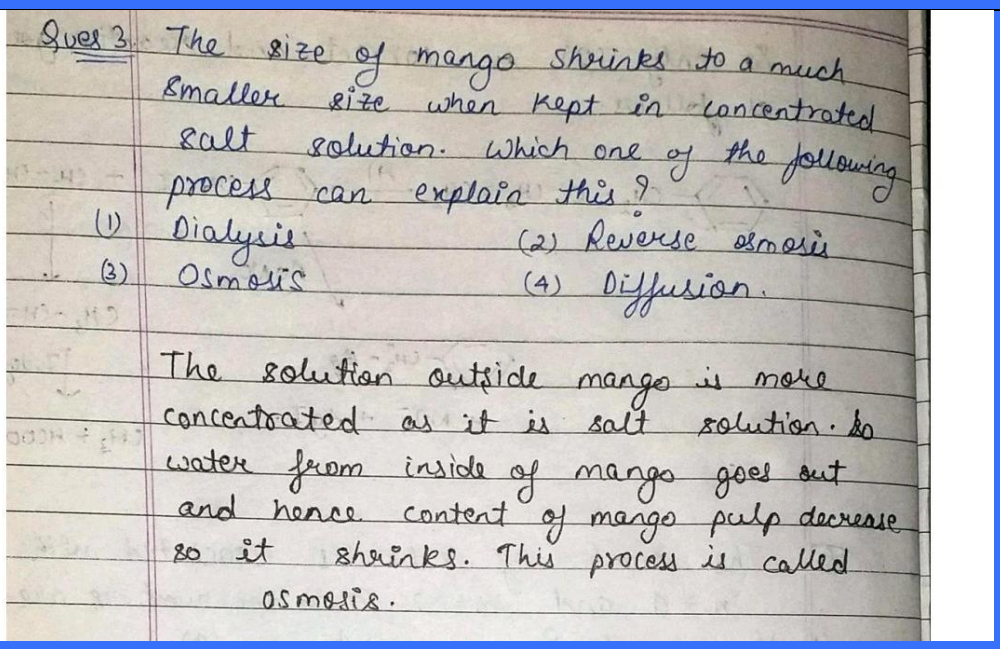
So (b) is correct.

(c) → on adsorption, residual forces acting along surface remains same but that ⊥r to surface decreases

(d) With increase in temp. eq. conc. of adsorbate decrease and deadsorption take place

So option (3) is correct

3



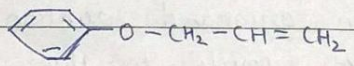
Ques 3. The size of mango shrinks to a much smaller size when kept in concentrated salt solution. Which one of the following process can explain this?

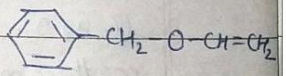
(1) Dialysis (2) Reverse osmosis
(3) Osmosis (4) Diffusion.

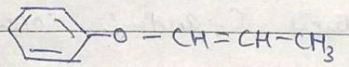
The solution outside mango is more concentrated as it is salt solution. So water from inside of mango goes out and hence content of mango pulp decrease so it shrinks. This process is called osmosis.

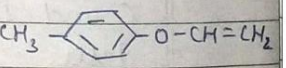
4

Ques. 4. An organic compound 'A' ($C_9H_{10}O$) when treated with conc. HI undergo cleavage to give compound B and C. B gives yellow ppt. with $AgNO_3$ whereas D taletomerise to 'D'. 'D' gives +ve Iodoform test. 'A' could be

(1) 

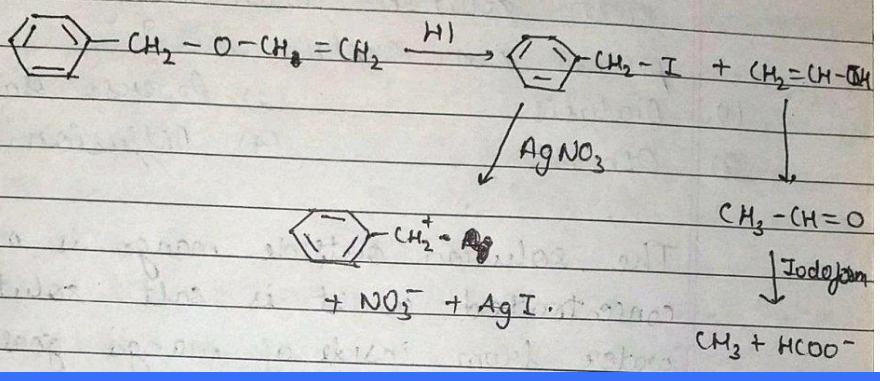
(2) 

(3) 

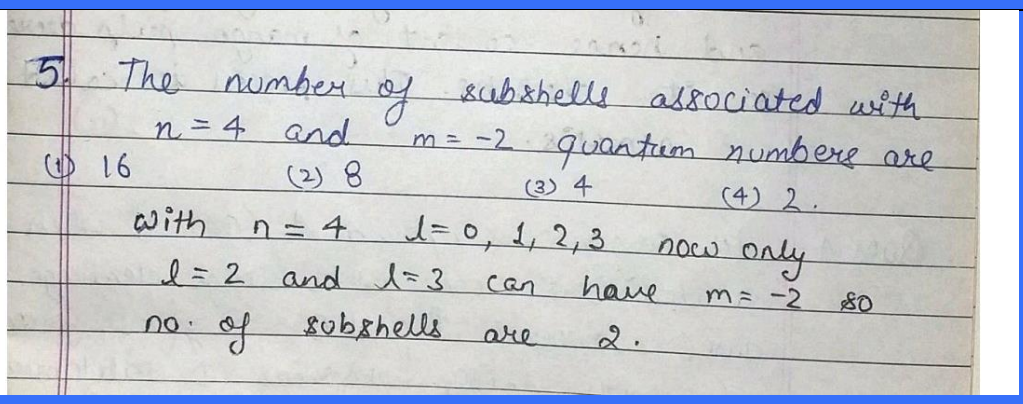
(4) 

(1), (3) (4) cant be right answers as they can't be cleaved by HI as O is directly attached to benzene ring.

So only (2) is correct and reaction goes as follows.



5



5. The number of subshells associated with $n = 4$ and $m = -2$ quantum numbers are

(1) 16 (2) 8 (3) 4 (4) 2.

with $n = 4$ $l = 0, 1, 2, 3$ now only $l = 2$ and $l = 3$ can have $m = -2$ so no. of subshells are 2.

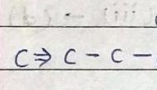
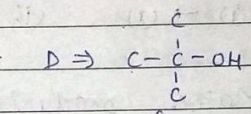
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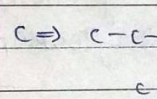
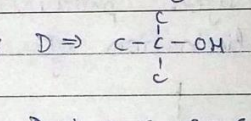
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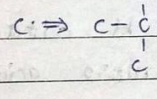
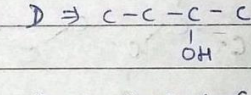
6. Two compounds A and B have same formula (C_3H_8O) undergo grignard reaction with methylmagnesium bromide to give products C and D. Products C and D show following tests

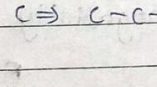
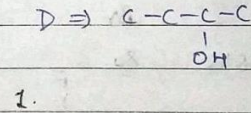
Test	C	D.
Ceric Ammonium nitrate test	Positive	Positive
Lucas test	Turbidity after 5 minutes	Turbidity immediately
Iodoform test	Positive	Negative.

(C) and D are respectively :-

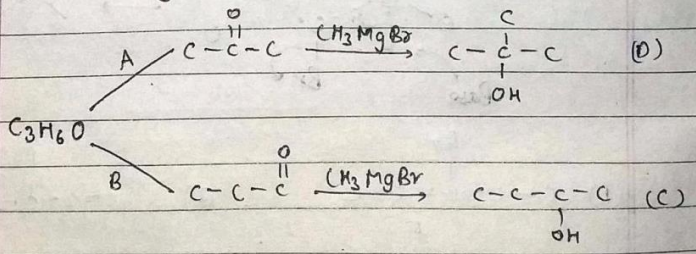
(1.) C ⇒  ; D ⇒ 

(2) C ⇒  ; D ⇒ 

(3) C ⇒  ; D ⇒ 

(4) C ⇒  ; D ⇒ 

Check by option 1.



now C and D shows all characteristic of test in table given above so by hit and trial method (1) is correct.

7

Match the following

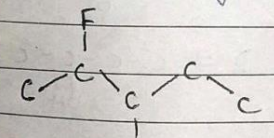
(i)	ion - ion	(a)	$1/r$
(ii)	Dipole - Dipole	(b)	$1/r^2$
(iii)	London dispersion	(c)	$1/r^3$
		(d)	$1/r^6$

This is from Ncert the correct match is

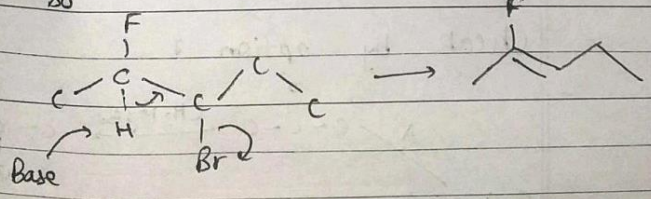
(i) → (a) (ii) → (b) (iii) → (d)

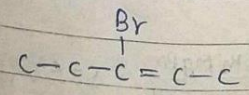
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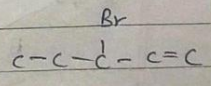
Major product obtained from E_2 elimination of 3-bromo-2-flouropentane is

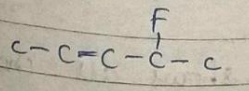


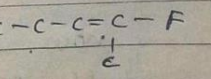
now H attached to F is more acidic as electronegativity of F is more so



(1) 

(2) 

(3) 

(4) 

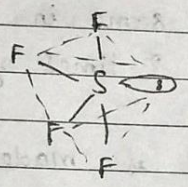
hence option (4) is correct

9

9) Molecular Geometery of SF_6 is octahedral, geometry of SF_4 (including lone pair) of electron, if (any) is ?

(1) Sq. Planar (2) Tetrigonal bipyramid
(3) Tetrahedral (4) Pyramidal

Here including lp is asked. so.



so it is trigonal bipyramid if asked without lp it would be Sel-saw shaped so (2) is correct.

10

10.) The result given in below table were obtained during kinetic - studies of the following reaction :

$$2A + B \longrightarrow C + D.$$

Exp.	[A] / mol L^{-1}	[B] / mol L^{-1}	Initial rate
I	0.1	0.1	6.00×10^{-3}
II	0.1	0.2	2.4×10^{-2}
III	0.2	0.1	1.2×10^{-2}
IV	X	0.2	7.2×10^{-2}
V	0.3	Y	2.88×10^{-1}

X and Y are respectively

(1) 0.3 , 0.4 (2) 0.4 , 0.3

(3) 0.4 , 0.4 (4) 0.3 , 0.3

Let rate expression be $\text{Rate} = K[A]^m[B]^n$

from (I) and (II) if [B] is doubled rate becomes 4 times of n must be 2.

from (I) and (III) if [A] is doubled Rate is doubled so $m = 1$.

now (II) and (IV) [B] is same in both cases so X must be 3 times of 0.1 as $m = 1$.

from (I) and (V) [A] is made 3 times but reaction ~~four times~~ goes as follows.

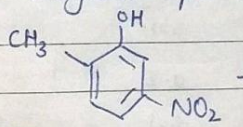
$$\frac{2.88 \times 10^{-1}}{6.00 \times 10^{-3}} = \frac{(0.3)(Y)^2}{(0.1)(0.1)^2}$$

$$\Rightarrow Y = 0.4$$

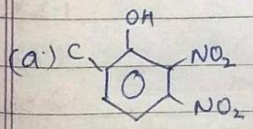
So option (1) is correct.

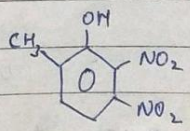
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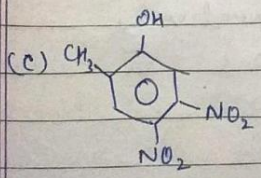
11. The major product of following reaction is

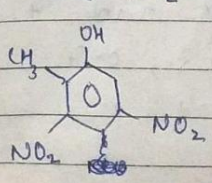


Conc HNO_3 + Conc. H_2SO_4 →

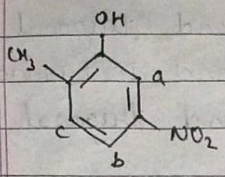
(a)


(b)


(c)


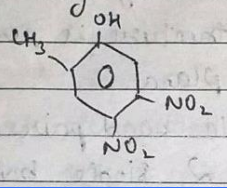
(d)


conc HNO_3 + conc H_2SO_4 solution gives electrophile NO_2^+. This is electrophilic substitution reaction.



position (b) is favoured as it has +M of OH and -M of NO_2.

(a) has hindered sight for attack by NO_2^+ (c) do not has a strong +M by OH it has -I of OH. so product is



12

12. The one not expected to show isomerism is

(a) $[Ni(NH_3)_2Cl_2]$ (b) $[Ni(NH_3)_4(H_2O)_2]^{2+}$

(c) $[Ni(en)_3]^{2+}$ (d) $[Pt(NH_3)_2Cl_2]$

Correct choice is (a)

(a) Ni here has tetrahedral shape so a molecule having tetrahedral shape and of form MA_2B_2 do not show isomerism

(b) shows geometrical isomerism as it is octahedral of form MA_4B_2

(c) this is most imp. to remember because it do not show geo. isomerism but show optical iso.

(d) Sq. planar so show geometrical isomerism.

13

13

The shape of $[XeF_5]^-$ and XeO_3F_2 are

(1) octahedral and sq. planar

(2) Trigonal bipyramid and trigonal bipyramid

(3) Trigonal bipyramid and pentagonal

(4) Pentagonal planar and trigonal bipyramidal

XeF_5^- ⇒ 5 bond paid + 2 lone pair

⇒ sp^3d^3 hybridisation.

⇒ so structure is pentagonal planar

XeO_3F_2 ⇒ 3 double bond pair with O

+ 2 single bond pair with F

+ 0 lone pair

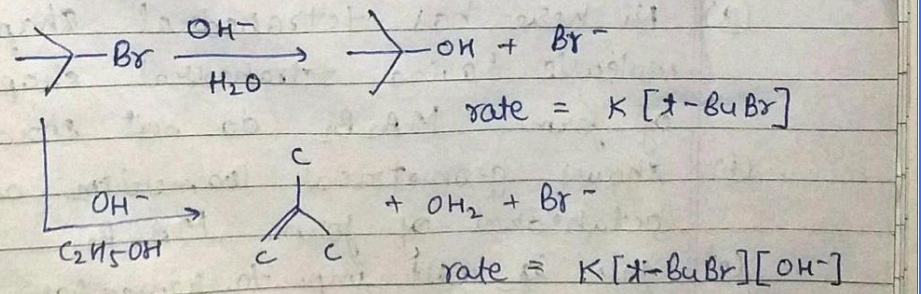
⇒ sp^3d hybridisation

⇒ trigonal bipyramid structure

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14

14. Consider the reaction sequence as given below :-



(1.) Changing conc. of base will have no effect on reaction (1)

(2.) Doubling conc. of base will double the rate of both reaction

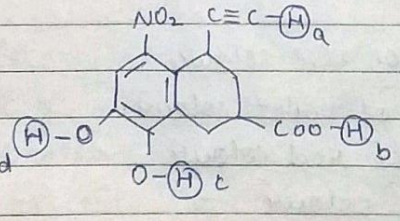
(3) Changing the conc. of base will have no effect on reaction (2)

(4) $^{\ominus}OR$ will have no effect on reaction (2)

from question it is clear first reaction do not depend on conc. of base so it is S_N1 2nd depends on conc. of base so it is E_2 as elimination H takes place.
so only option (1) is correct all other are straighaway wrong.

15

15. Arrange the following laballed hydrogens in decreasing order of acidity:



(1) b > c > d > a (2) c > b > a > d

(3) b > a > c > d (4) c > b > d > a

Acidic strength of H follows the order

$R-COOH > Ph-OH > R-C\equiv CH$

as Ph-OH occurs in both (d) and (c) but (c) is more acidic due to -M effect of NO_2 so order is b > c > d > a

16

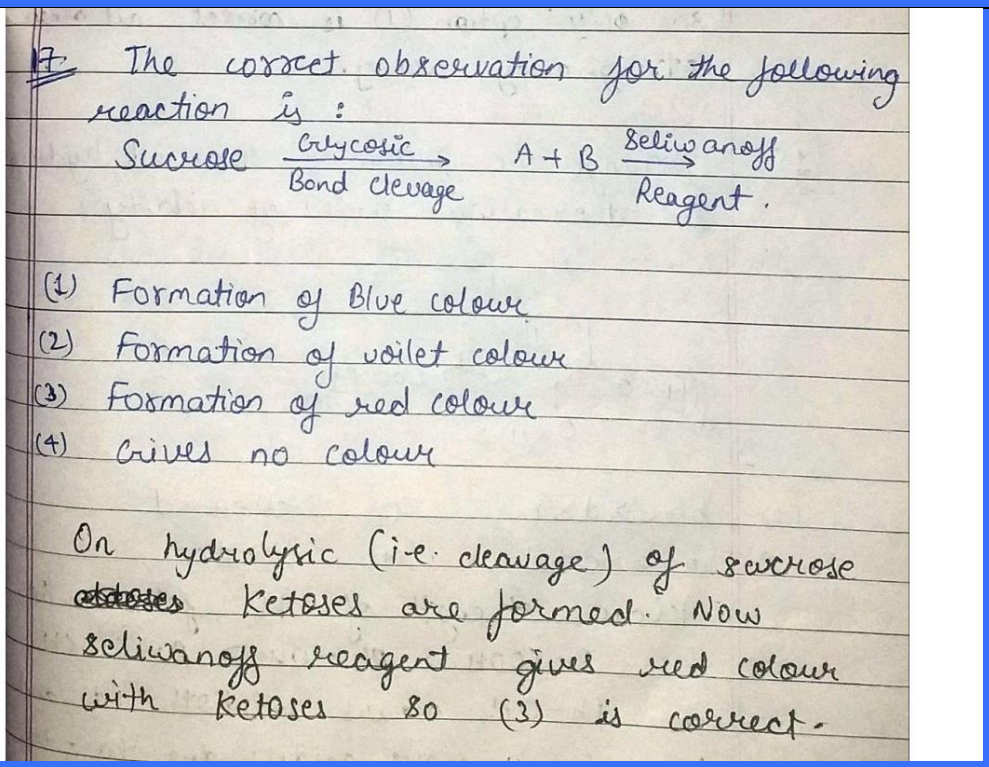
16. If you spill a ~~vinegar~~ chemical toilet cleaning liquid on your hand, your first aid would be:

(1) vinegar (2) aqueous NaOH

(3) aqeous $NaHCO_3$ (4) aqeous NH_3

Toilet cleaning liquid contain HCl an acid so vinegar itself an acid can't be used. NaOH could realeased more heat on reaction with HCl which can worsen situation. NH_3 will also cause same effect. so $NaHCO_3$ is most appropriate so (3) is correct.

17



7. The correct observation for the following reaction is :

Sucrose $\xrightarrow[\text{Bond cleavage}]{\text{Glycosic}}$ A + B $\xrightarrow[\text{Reagent.}]{\text{Seliwanoff}}$

(1) Formation of Blue colour
(2) Formation of voilet colour
(3) Formation of red colour
(4) Gives no colour

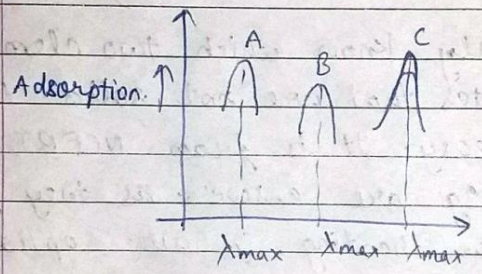
On hydrolytic (i.e. cleavage) of sucrose ~~aldoses~~ Ketoses are formed. Now seliwanoff reagent gives red colour with Ketoses so (3) is correct.

18

18. Simplified absorption spectra of three complexes (i) (ii) (iii) of Mn^{n+} ions are provided below; their λ_{max} values are marked as A, B, C respectively. The correct match b/w complexes and λ_{max} values is :-

(i) $[M(NCS)_6]^{(6+n)}$ (ii) $[MF_6]^{(-6+n)}$

(iii) $[M(NH_3)_6]^{(n+)}$



1.) A-(i), B-(ii) C,-(iii) (2) A-(ii), B-(iii), C-(i)

3.) A-(ii), B-(i), C-(iii) (4) A-(iii), B-(i), C-(ii)

Stronger ligand causes more splitting of t_{2g} and e_g orbitals and hence imply smaller wavelength light to be absorbed

(i), (ii), (iii) have ligands - NCS^-, F^-, NH_3 where their strength order is $NH_3 > NCS^- > F^-$

so $\lambda_{NH_3} < \lambda_{NCS^-} < \lambda_{F^-}$

so (iii)-(A) (i)-(B) (ii)-(C).

19

19. Two elements A and B have similar chemical properties. They don't form solid hydrogencarbonates, but react with N_2 to form nitrides, A and B respectively are :-

(1) Li and Mg (2) Na and Ca

(3) Na and Rb (4) Cs and Ba.

If one only know which two elements formed bicarbonates that are not solid the question is very easy. It is from NCERT directly Li and Mg are answer. as they form nitrides on heating in air. option (1).

20

20. Three elements X, Y, Z are in 3rd period of periodic table. The oxides of X, Y, Z respectively are basic, amphoteric and acidic. The correct order of atomic no:s of X, Y, Z are

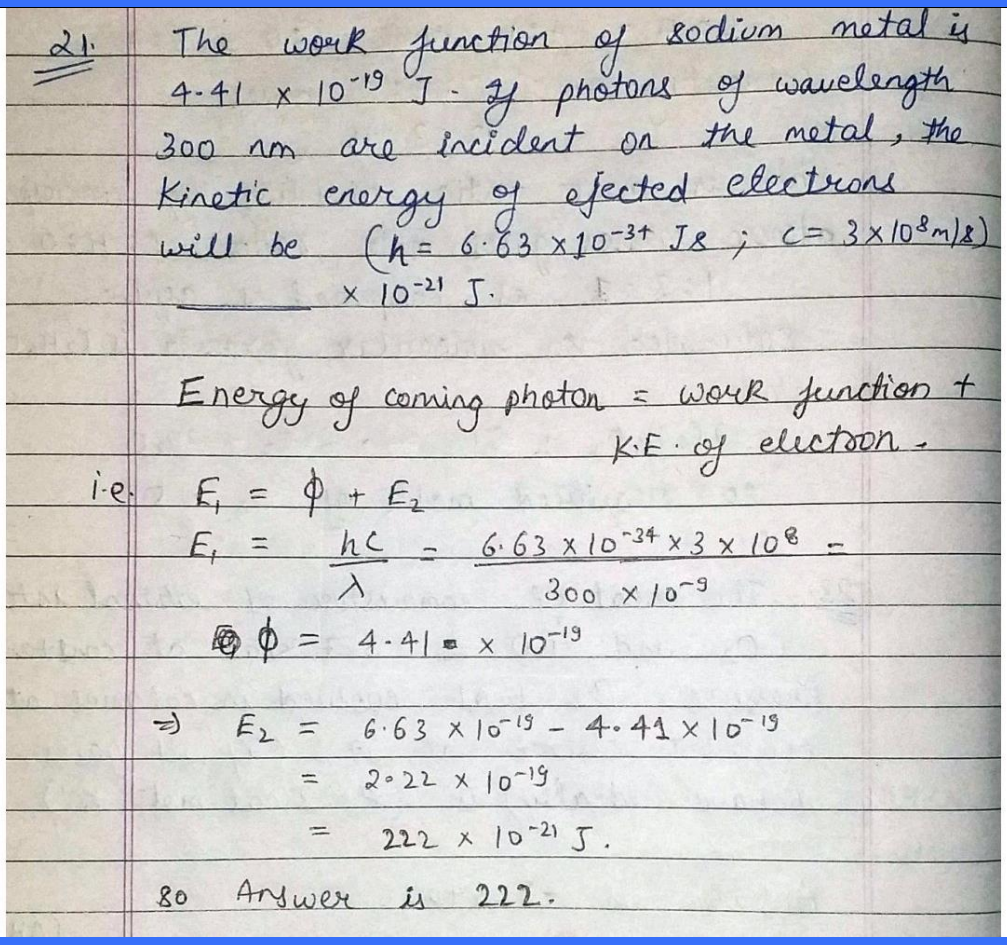
(1) $X < Y < Z$ (2) $Z < Y < X$

(3) $X < Z < Y$ (4) $Y < X < Z$.

We know that across a period from left to right nature of oxide changes from basic to amphoteric to acidic so correct order is $X < Y < Z$.

option (1).

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21. The work function of sodium metal is 4.41×10^{-19} J. If photons of wavelength 300 nm are incident on the metal, the kinetic energy of ejected electrons will be ($h = 6.63 \times 10^{-34}$ Js ; $c = 3 \times 10^8$ m/s) $\times 10^{-21}$ J.

Energy of coming photon = work function + K.E. of electron.

i.e. $E_1 = \phi + E_2$

$E_1 = \frac{hc}{\lambda} = \frac{6.63 \times 10^{-34} \times 3 \times 10^8}{300 \times 10^{-9}} =$

$\phi = 4.41 \times 10^{-19}$

$\Rightarrow E_2 = 6.63 \times 10^{-19} - 4.41 \times 10^{-19}$

$= 2.22 \times 10^{-19}$

$= 222 \times 10^{-21}$ J.

So Answer is 222.

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22. The ratio of mass percentages of 'C' and 'H' and 'C' and 'O' of a saturated acyclic organic compound 'X' are 4:1 and 3:4 respectively. The no. of moles of O_2 required for complete combustion of two moles of compound X is ___

Answer is 5.

C : H = 4 : 1 and C : O = 3 : 4

converting to C : H : O gives

12 : 3 : 16

this is mass ratio dividing by corresponding atomic masses gives mole ratio. C : H : O as

1 : 3 : 1 as compound is acylic, saturated so molecular formula is $C_2H_6O_2$.

now

$$2C_2H_6O_2 + 5O_2 \longrightarrow 2CO_2 + 3H_2O$$

so required moles of O_2 = 5.

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23. The heat of combustion of ethanol into CO_2 and H_2O is -327 Kcal at constant Pressure. The heat evolved in calories at constant volume at 27°C (if all gases behave ideally) is ($R = 2$ cal mol^{-1} K^{-1})

Answer is -326400

$$C_2H_5OH + O_2 \longrightarrow 2O_2 + 3H_2O(l) \quad (\Delta H) \; -327$$

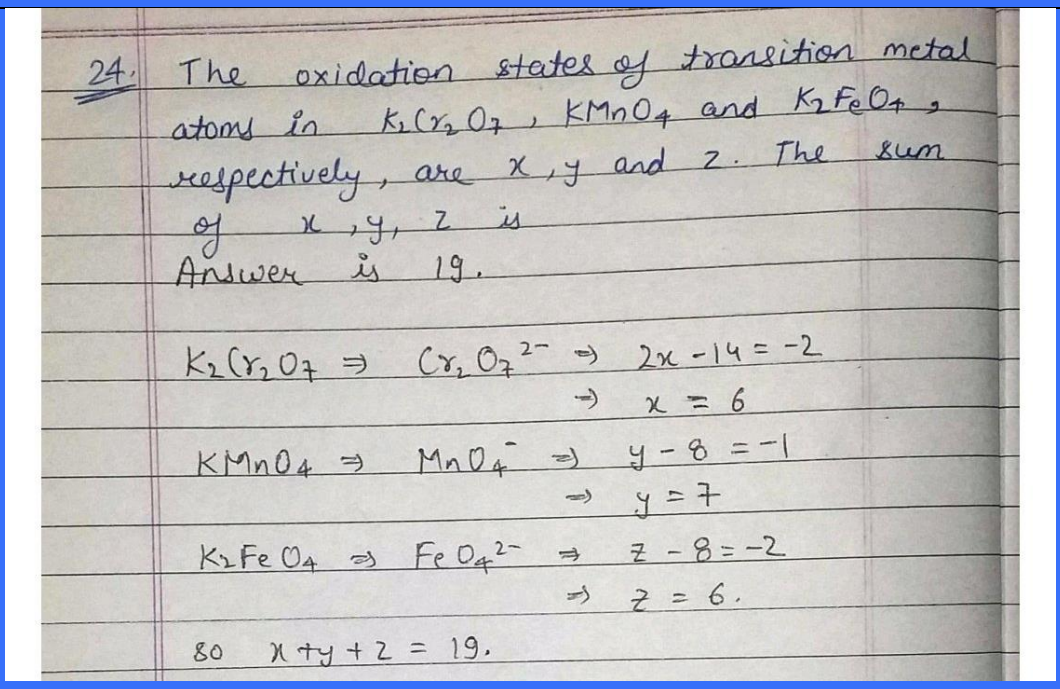
$\Delta H_c = \Delta U_c + \Delta n_g RT$

$-327 \times 10^3 = \Delta U_c + 1 \times 2 \times 300$

$\Delta n = 1$ as C_2H_5OH is liquid so $\Delta n_g = 1$

$\Rightarrow \Delta U_c = -326400$ cal.

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24. The oxidation states of transition metal atoms in $K_2Cr_2O_7$, $KMnO_4$ and K_2FeO_4, respectively, are x, y and z. The sum of x, y, z is

Answer is 19.

$K_2Cr_2O_7 \Rightarrow Cr_2O_7^{2-} \Rightarrow 2x - 14 = -2$

$\Rightarrow x = 6$

$KMnO_4 \Rightarrow MnO_4^- \Rightarrow y - 8 = -1$

$\Rightarrow y = 7$

$K_2FeO_4 \Rightarrow FeO_4^{2-} \Rightarrow z - 8 = -2$

$\Rightarrow z = 6.$

So $x + y + z = 19.$

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25. For the disproportionation reaction
$2Cu^{+}(aq) \rightleftharpoons Cu(s) + Cu^{2+}(aq)$ at 298K, ln K (where K is the equilibrium constant) is ____ $\times 10^{-1}$.

Given: ($E^{\circ}_{Cu^{2+}/Cu^{+}} = 0.16V$;

$E^{\circ}_{Cu^{+}/Cu} = 0.52V$; $\frac{RT}{F} = 0.025$)

Answer is 144

$E^{\circ}_{cell} = E^{\circ}_{Cu^{+}/Cu} - E^{\circ}_{Cu^{2+}/Cu^{+}}$

$= 0.52 - 0.16 = 0.36V$

now at equilibrium we know

$E^{\circ}_{cell} = \frac{RT}{nF} \ln K_{eq} \Rightarrow \frac{0.025}{1} \ln K = 0.36$

here value of $n = 1$ as reaction $2Cu^{+} \rightleftharpoons Cu + Cu^{2+}$ can be split as $Cu^{+} \rightleftharpoons Cu$

$Cu^{+} \rightleftharpoons Cu^{2+}$

each having $n = 1$.

So $\ln K = 14.4 = 144 \times 10^{-1}$.

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