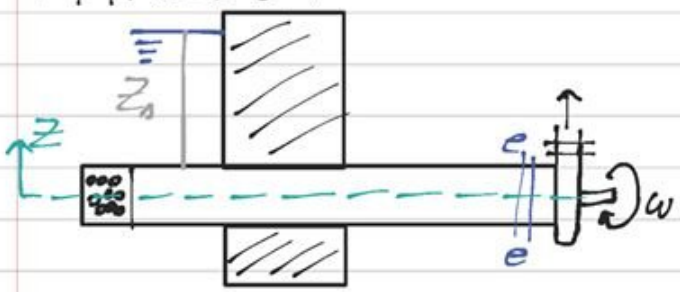
PHA2304 04



$$Z_s + \left(\frac{P_s}{\rho g}\right)_{abs} + \frac{V_s^2}{2g} = Z_e + \frac{V_e^2}{2g} + \left(\frac{P_e}{\rho g}\right)_{abs} + \Delta H_s \Leftrightarrow$$

$$\left[\left(\frac{P_e}{\rho g}\right)_{abs} + \frac{V_e^2}{2g} - \frac{P_v}{\rho g}\right] = \left(\frac{P_{atm}}{\rho g}\right)_{abs} + Z_s - \Delta H_s$$

$$NPSH_{disp.} = \left(\frac{P_{atm}}{\rho g}\right)_{abs} + \Delta Z - \Delta H_s - \frac{P_v}{\rho g}$$

* Dicas: $(P_{abs})_{atm} = \rho_{Hg} \cdot g \cdot h_{Hg} = 13600 \cdot 9,81 \cdot 0,76 = 101361\ Pa$

$$\left(\frac{P_{atm}}{\rho g}\right)_{abs} = \frac{101361}{1000 \cdot 9,81} = 10,33\ m \quad ; \quad \left(\frac{P_{atm}}{\rho g}\right) = 10,33 - \frac{Z}{900}$$

↳ $\left(\frac{P_v}{\rho g}\right) = 0,077 \cdot e^{0,0558 \cdot \Theta}$, com Θ em °C

↳ Diâmetro ótimo da flange de sucção: $D_{ótimo} = 4,5 \cdot \sqrt[3]{\frac{Q}{n}}$
com Q em m^3/s ; n em rpm ; D em m

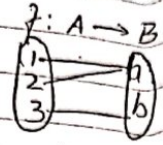
↳ $NPSH_{req} \cong 0,203 \cdot w_s^{4/3} \cdot \frac{H^*}{\eta_{máx}}$; $w_s = w \cdot \frac{\sqrt{Q^*}}{(gH^*)^{3/4}}$

Calculus:

Function(f): is a rule which associates every element of set A to a unique element of set B.

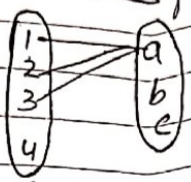
Eg:

i) $f: A \to B$



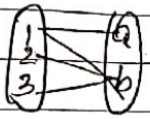
∴ It is a function.

ii)



∴ It is not a function because 4 does not have an image.

iii)



∴ It is not a function as 1 does not have a unique image.

iv) $f(x) = 2x+3$ is a function on Natural nos.

v) $x = f(p)$ is a demand function, where $x \to$ quantity, $p \to$ price.

Limit of a function:

$f(x)$ is said to have a limit as $x \to a$ if $\lim_{x \to a^+} f(x) = f(a) = \lim_{x \to a^-} f(x)$

Properties of limits

- $\lim_{x \to a} (f(x) \pm g(x)) = \lim_{x \to a} f(x) \pm \lim_{x \to a} g(x)$
- $\lim_{x \to a} (f(x)\, g(x)) = \lim_{x \to a} f(x) \cdot \lim_{x \to a} g(x)$
- $\lim_{x \to a} \left[\frac{f(x)}{g(x)}\right] = \frac{\lim_{x \to a} f(x)}{\lim_{x \to a} g(x)}$

Scanned by CamScanner

GOC

 # Basics:- Sara khel electron density ka hai.

Electron density $\propto \frac{1}{\text{Size}}$

E.g:- Size :- C > N > O > F

Electron density :- $C^{\ominus} < N^{\ominus} < O^{\ominus} < F^{\ominus}$

Electron density $\propto$ (-ve) charge $\propto \frac{1}{\text{(+ve) charge}}$

E.g:- Electron density :- $A^{3-} > A^{2-} > A^{-} > A > A^{+} > A^{2+}$

Inductive Effect

- Operate to sigma bond.
- Partial charge development.
- Distance dependent effect.
- Can be neglected after 3rd 'C'-atom.

⇒ Power of Inductive effect

⇒ **+I Power** :- (e^- donating grp)

- $-\overset{\ominus}{C}H_2 > -\overset{\ominus}{N}H > -\overset{\ominus}{O} > -COO^{\ominus} > 3°R > 2°R > 1°R > -Me$
- $-T > -D >$ **[H]** → No inductive (zero)

⇒ **- I group** :- (e^- withdrawing grp)

$-\overset{+}{N}F_3 > -\overset{+}{N}R_3 > -\overset{+}{S}R_2$

Na Parhan Naritik Shahrukh

$-NH_3 > -NO_2 > SO_3H > -CN >$

Na hiwesh Na Ompuri Salman Cyna

$-CHO > -COOH > -F > -Cl > -Br >$

ali ki car me father collector Beta

$-I > -OR > -OH > -C\equiv CH >$

Inspector aur Alcohol ki mummy Alkyne

$-NH_2$ or $NR_2 > -Benz > Ene > H$

nahi hai Benz ene hai

 # Applications

① To compare Acidic strength of Aliphatic Carboxylic Acid without Benzene ring (openchain / cycloalkane)

⇒ **OP Point :-**

① **$A.S \propto [H^+] \propto Ka \propto \frac{1}{pH} \propto \frac{1}{pKa}$**

[-I] $-\overset{O}{\overset{\|}{C}}-O-H \rightleftharpoons$ **[-I]** $\leftarrow \overset{O}{\overset{\|}{C}} \leftarrow O^{\ominus} + H^{\oplus}$

Good Acid More stable

$A.S \propto -I \propto \frac{1}{+I}$

-I stabilizes anion
+I destabilizes anion

② D > N > P

Distance Number Power

DNP Trick DO NOT PLAY

② To compare A.S of Alcohols

[-I] $-O-H \rightleftharpoons$ **[-I]** $-O^{\ominus} + H^{\oplus}$

$A.S \propto -I \propto \frac{1}{-I}$ → same as carboxylic Acid.

③ To compare Basic strength of Amines

$B.S \propto +I \propto \frac{1}{-I}$

$R-NH_2$ R_2NH R_3N
1° 2° 3°

In gas phase :- 3° > 2° > 1°

In aquous medium :- R = me (2° > 1° > 3°)
R = Et (2° > 3° > 1°)

onwards → R = Prop, but ... etc
↳ Always [3° > 2° > 1°]

According to solvation :- [1° > 2° > 3°]

According to +I effect :- [3° > 2° > 1°]

④ To compare stability of carbocations

[+I] → $\overset{\oplus}{C}$ ← **[+I]**, ↑ **[+I]**

Stability $\propto$ +I $\propto \frac{1}{-I}$ (C+)

⑤ To compare stability of carboanions

[-I] ← $\overset{\ominus}{C}$ → **[-I]**, ↓ **[-I]**

Stability $\propto$ -I $\propto \frac{1}{+I}$ (C^-)

CYAN