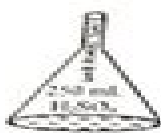


অধ্যায় ১: ল্যাবরেটরির নিরাপদ ব্যবহার



পরীক্ষার কপূর, এখানে সেরে পড়িও, আরও কলেক্সের শীর্ষস্থানীয় কলেক্সমুকের পরীক্ষা এবং মতামত টিউটর পড়িয়ে
ল্যাবর উত্তর অধ্যায়ভিত্তিক সেওয়া হয়েছে। এগুলোর অনুশীলন করলে তুমি এ অধ্যায়টি থেকে সেরেওয়ে পূজনীয় কলেক্সমুকের
এদের উত্তর লিখতে পারবে সহজেই।

প্রশ্ন ১



পাত্র-A



পাত্র-B

সি. কে. ১০/১ এর নং ১/

- মোলের প্রকণ কী?
- "কেলস পানিদ্রুত লবণের দ্রাব্যতা, 'আপমাত্রা বৃদ্ধির সাথে সাথে এক পর্যায়ে বৃদ্ধি না পেয়ে হ্রাস পায়'— ব্যাখ্যা করো।
- A-পাত্রে বিদ্যমান এসিডের ভর কত নির্ণয় করো।
- দ্রব দুটি মিশ্রিত করলে, মিশ্রণটি কী পরিমাণ অক্সিজেন দ্বারা প্রক্রিয় হতে পারে— বিশ্লেষণ করো।

১ নং প্রশ্নের উত্তর

1000 mL দ্রবণে কোন দ্রবের 1 mol দ্রবীভূত থাকলে উক্ত দ্রবকে মোলার দ্রবণ বলে।

কেলস পানিদ্রুত লবণের দ্রাব্যতা আপমাত্রা বৃদ্ধির সাথে সাথে এক পর্যায়ে বৃদ্ধি না পেয়ে হ্রাস পায়। এর কারণ, আপমাত্রা বৃদ্ধির সাথে সাথে দ্রাব্যতা বৃদ্ধি পেতে থাকলেও একটি নির্দিষ্ট আপমাত্রার কেলস পানি দ্রুত লবণ নিষ্কৃতি হয়। তখন দ্রাব্যতা হ্রাস পেতে থাকে। উদাহরণস্বরূপ $\text{Na}_2\text{SO}_4 \cdot 10\text{H}_2\text{O}$ এর কথা বলা যায়। $\text{Na}_2\text{SO}_4 \cdot 10\text{H}_2\text{O}$ এর ক্ষেত্রে পানিতে দ্রবীভূত করার সময় বিয়োজন প্রক্রিয়াটি তাপশক্তি বিক্রিয়া কিন্তু 32.4°C তাপমাত্রার উপরে $\text{Na}_2\text{SO}_4 \cdot 10\text{H}_2\text{O}$ যখন Na_2SO_4 এ পরিণত হয় তখন বিয়োজন প্রক্রিয়াটি তাপোৎপাদী হয়। এ কারণে 32.4°C তাপমাত্রার উপরে আপমাত্রা বৃদ্ধিজনিত কারণে দ্রাব্যতার হ্রাস ঘটে।

২

আমরা জানি,
 $w = SMV$
 $= (0.5 \times 98 \times 0.25) \text{ g}$
 $= 12.25 \text{ g}$

অতএব, দ্রবীভূত H_2SO_4 এর ভর
 $= 12.25 \text{ g}$

উদ্দীপকের A-পাত্রে অবস্থিত,
 H_2SO_4 এর আণবিক ভর,
 $M = 1 \times 2 + 32 + 16 \times 4$
 $= 2 + 32 + 64$
 $= 98 \text{ g/mol}$

দ্রবণের ঘনমাত্রা,
 $S = 0.5 \text{ M}$
দ্রবণের আয়তন,
 $V = 250 \text{ mL}$
 $= \frac{250}{1000} = 0.25 \text{ L}$

দ্রবীভূত H_2SO_4 এর ভর, $w = ?$

১১ পাত্র-A: H_2SO_4 এর মোল সংখ্যা $= \left(0.5 \times \frac{250}{1000}\right) \text{ mol}$
 $= 0.125 \text{ mol}$

পাত্র-B: Na_2CO_3 এর মোল সংখ্যা $= \left(0.11 \times \frac{250}{1000}\right) \text{ mol}$
 $= 0.077 \text{ mol}$

সম্বন্ধিত বিক্রিয়া: $\text{H}_2\text{SO}_4 + \text{Na}_2\text{CO}_3 \rightarrow \text{Na}_2\text{SO}_4 + \text{H}_2\text{O} + \text{CO}_2$

সমীকরণ হতে পাই, 1 mol $\text{H}_2\text{SO}_4 = 1 \text{ mol Na}_2\text{CO}_3$

1 mol Na_2CO_3 বিক্রিয়া করে H_2SO_4 এর 1 mol এর সাথে
 $0.077 \text{ mol} = 0.077 \text{ mol} = 0.077 \text{ mol} = 0.077 \text{ mol}$

অবশিষ্ট H_2SO_4 এর পরিমাণ $= (0.125 - 0.077) \text{ mol}$
 $= 0.048 \text{ mol}$

পাত্র-A এর দ্রবণের সাথে পাত্র-B এর দ্রবণের বিক্রিয়ার ফলে 0.048 mol H_2SO_4 অবশিষ্ট থাকায় মিশ্রিত দ্রবণের প্রকৃতি হবে অম্লীয়।

১২ একমল ছাত্র ল্যাবরেটরিতে X-পদ্ধতিতে 10 mg এর তরুণ পরিমাণ এবং Y-পদ্ধতিতে 0.5 g পরিমাণ 2% $\frac{W}{V}$ HCl এর নমুনা কাল করে।

সি. কে. ১০/১ এর নং ১/

- নোড কাকে বলে?
- Cl_2 অপোলার— ব্যাখ্যা করো।
- উদ্দীপকের এসিডটির মোলার ঘনমাত্রা নির্ণয় করো।
- উদ্দীপকের কোন পদ্ধতি পরিবেশবান্ধব? বিশ্লেষণ করো।

২ নং প্রশ্নের উত্তর

নিউক্লিয়াসের চারদিকে যে নির্দিষ্ট ত্রিমাত্রিক স্থানে কোন ইলেক্ট্রন পাওয়ার সম্ভাব্যতা শূন্য তাকে নোড বলে।

সমযোজী বন্ধনে আবদ্ধ উভয় পরমাণুর তড়িৎ ঋণাত্মকতা হল অর্ধাং তড়িৎ ঋণাত্মকতার পার্থক্য শূন্য হলে সমযোজী বন্ধন শূন্য ও অপোলার হয়। আর তড়িৎ ঋণাত্মকতার পার্থক্য 0.5 এর কম হলে অপোলার হয়। যেহেতু Cl এর তড়িৎ ঋণাত্মকতা 3.0 ও C অণুতে তড়িৎ ঋণাত্মকতার পার্থক্য $(3 - 3) = 0$, তাই Cl_2 বিশুদ্ধ সমযোজী ও অপোলার যৌগ। উল্লেখ্য যৌলিক অণুর ক্ষেত্রে এহুণ ঘ থাকে।

উদ্দীপকে বর্ণিত এসিডটি হলো 2% $\left(\frac{W}{V}\right) \text{ HCl}$

2% $\left(\frac{W}{V}\right) \text{ HCl}$ এর অর্থ হলো—

100 mL দ্রবণে HCl এর ভর 2g

$\therefore 1000 \text{ mL} \text{ " " " " } \left(\frac{2 \times 1000}{100}\right) \text{ g}$
 $= 20 \text{ g}$

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S Ben Porath



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