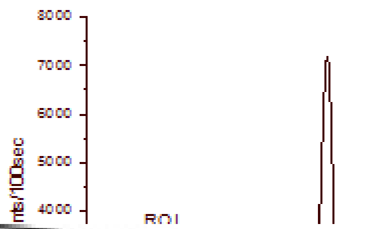
distilled water and detergent. Water, kerosene and petrol were taken in three separate glass beakers. The kerosene – petrol mixtures of different densities were obtained by adding kerosene to petrol in different proportion. To prepare the kerosene – petrol mixture, the petrol was taken in clean glass beaker. The required amount of kerosene was gently added to the beaker. The mixture was stirred gently to get homogeneous mixture. The two kerosene – petrol mixtures of density 0.744gm/cm^3 and 0.761gm/cm^3 were prepared. Table (1) shows the density of samples used in this

The schematic of recorded spectrum with ROI is as shown in the Figure (2). Without disturbing the initial experimental geometry, water was filled into the glass beaker using injection syringe to a height of 1cm. The gamma ray spectrum was recorded for 100 seconds. The number of counts under ROI was noted. The experiment was repeated with different heights of water. The same procedure was employed for kerosene, petrol and kerosene- petrol mixtures.

The gamma back scattered count rates with varying height of samples are tabulated in the Table (2).



count rate (counts/sec). The Figure (3) shows the plots of count rate of backscattered gamma photons versus height of backscattered sample. Figure (4) shows count rate versus density for fixed height 5cm.

Table 2: ROI analysis for samples.

Sample	Index	Density (gm/cm^3)	Height (cm)	Centroid (keV)	Counts for 100 sec	Count rate
Water	W	1.00	0	202.460	13784.833	137.8483
			1	201.678	18433.333	184.3333
			2	200.977	19471.667	194.7167
			3	201.430	20031.000	200.3100
			4	201.572	20570.667	205.7067
			5	201.017	20296.000	202.9600
			6	200.518	19714.000	197.1400
			7	200.206	19483.500	194.8350
Kerosene	K	0.781	0	201.947	13866.833	138.6683
			1	201.944	17919.167	179.1917
			2	201.335	18331.000	183.3100
			3	201.717	19424.500	194.2450
			4	201.436	19960.167	199.6017
			5	201.543	19560.500	195.6050
			6	201.273	19290.667	192.9067
			7	200.996	19124.500	191.2450
Petrol	P	0.737	0	201.851	13804.667	138.0467
			1	201.935	16664.667	166.6467
			2	200.931	17576.000	175.7600
			3	200.698	18337.167	183.3717
			4	200.976	18731.833	187.3183
			5	201.295	19024.333	190.2433
			6	200.813	18685.500	186.8550
			7	200.857	18599.833	185.9983
Kerosene-petrol mixture1	KP1	0.744	0	201.373	13762.333	137.6233
			1	201.219	17317.167	173.1717
			2	200.709	17949.167	179.4917
			3	200.905	18681.167	186.8117
			4	201.068	19351.500	193.5150
			5	200.862	19298.333	192.9833
			6	200.692	18809.667	188.0967
			7	201.438	18782.667	187.8267
Kerosene-petrol mixture2	KP2	0.761	0	201.996	13723.833	137.2383
			1	202.960	17322.333	173.2233
			2	201.979	17998.500	179.9850
			3	201.030	19120.333	191.2033
			4	201.138	19493.667	194.9367
			5	201.713	19351.833	193.5183
			6	200.663	18958.667	189.5867
			7	201.189	18750.833	187.5083

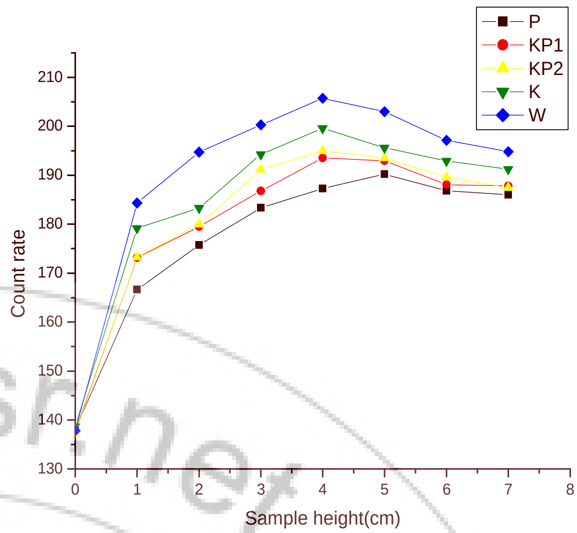


Figure 3: Count Rate versus sample height.

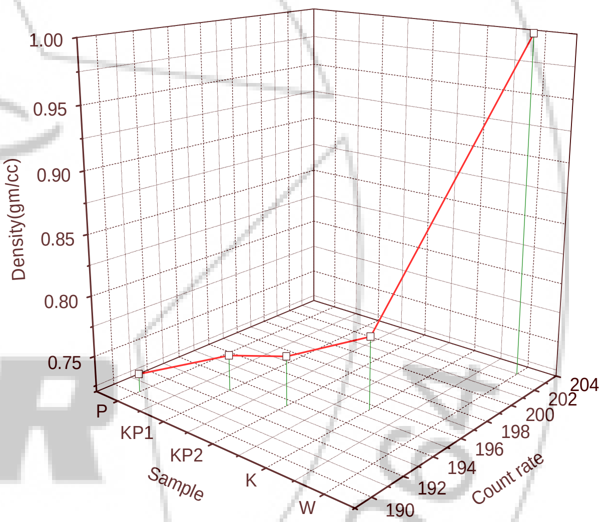


Figure 4: Count Rate versus density for fixed sample height

4. Conclusion

From the Figure (3) it can be seen that count rate increases with increasing height of sample up to certain distance and thereafter it decreases slowly for greater height. For water, kerosene and kerosene- petrol mixture2 the count rate increases up to 4cm and decreases for greater height. For kerosene – petrol mixture1 and petrol the count rate increases up to 5cm and decreases for greater height. From the Figure (4) it is observed that for fixed height of sample i.e, 5cm, the count rate has maximum value for water because of its relatively high density followed by kerosene, kerosene- petrol mixture2 and kerosene – petrol mixture1 and has minimum value for petrol because of its relatively low density. From this experiment it is found that intensity of backscattered gamma photons is a function of sample density. It is possible to estimate the presence of kerosene in petrol by gamma backscattering technique. The gamma backscattering technique is very useful as sensitive analytical technique for performing quantitative analysis of adulteration in variety of samples. This technique can also be used to monitor minute variation of fluid level. Because of its accuracy and reliability it is used as important reference for other analytical methods.

5. Future Scope

The present work is purely based on experimental work. Inorder to understand the backscattering of gamma rays and its potential use, more and more theoretical work is needed.

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