SAFETY CONCERN RELATED TO CONSUMER PRODUCTS CONTAINING RADIOACTIVE MATERIALS IN MALAYSIA

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Introduction

A diverse range of consumer products containing radioactive substances are available in the public domain. Users are generally unaware of the presence of radioactivity in these products, as well as the potential harm that radiation exposure can cause if used incorrectly. As a result, it is critical to ensure that consumer products contain as little radioactivity as possible.

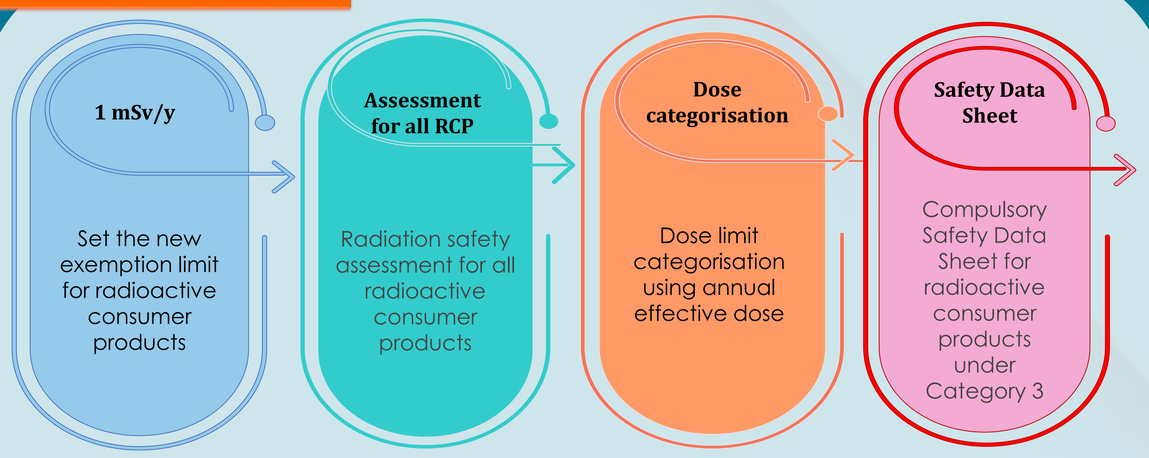
Background

The IAEA (GSR-Part 3) defined the term of Consumer Products (CP) as "A device or manufactured item into which radionuclides have deliberately been incorporated or produced by activation, or which generates ionizing radiation, and which can be sold or made available to members of the public without special surveillance or regulatory control after the sale". Three distinct categories of consumer products can be identified: (i) Products to which small amounts of radionuclides have been added for functional reasons or because of their physical or chemical properties; (ii) Equipment capable of generating radiation; (iii) Products which, as a result of being intentionally exposed to radiation, contain activation products. Proper guidelines in designing effective marketing advertisements by the government, manufacturers, sellers, and marketers of products containing radioactive materials, should be produced to ensure all vital information on consumer products containing radioactive substances and their potential risks to the environment and society are communicated effectively to the public.

Objectives

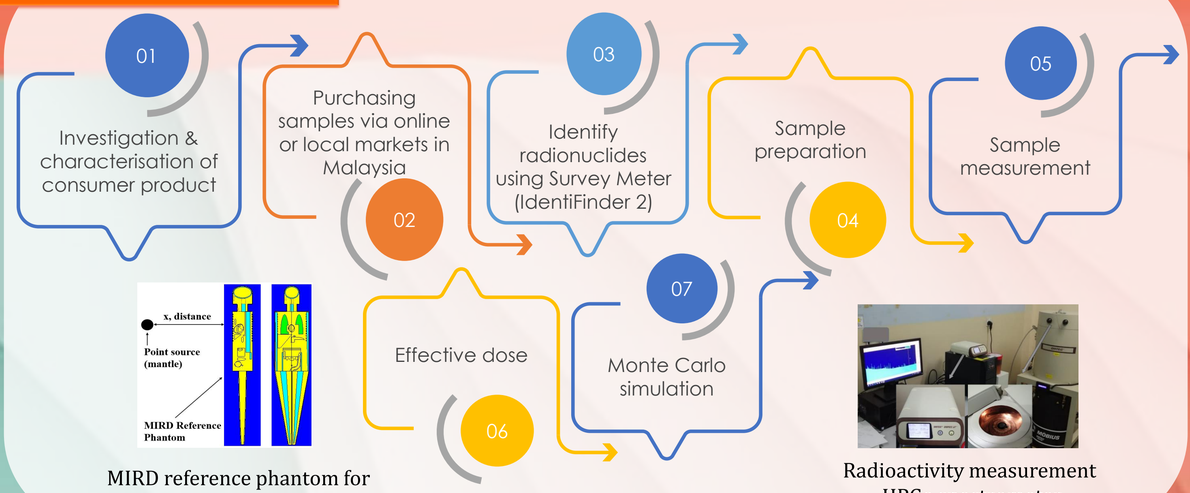
- To update particular guidelines for assessment and licensing of consumer products.
- To identify and distinguish present-day and prevalent consumer products, including pseudo-product, by establishing baseline data of radioactivity level, equivalent and effective dose received by the consumer.
- To evaluate the Malaysian consumer's radiation safety awareness towards products containing radioactive material and radiation risks to their health.
- To collect all available quantitative data about the number of different types of consumer products obtainable in Malaysia.
- To evaluate the worldwide requirements imposed by the competent authorities i.e types of prohibited product, and products that are subject to licensing, testing, labelling and controlled disposal.

Recommendation



Category	Criteria	Label	Requirement		
			RSA	SDS	License
1	<0.3 mSv/y	Low Activity Radioactive Material	O	-	-
2	>0.3 mSv/y but <1 mSv/y	Moderate Activity Radioactive Material	o	Optional	-
3	>1 mSv/y	High Activity Radioactive Material	o	Compulsary	o

Methodology



MIRD reference phantom for Monte Carlo simulation

Radioactivity measurement HPGe spectrometer

Findings

Category	Description	Radionuclides reported	Activities reported	Potential annual effective dose (AED)
Thoriated incandescent gas mantles	Lantern mantle	Th-232	0.005 - 12.51 kBq	1 pack of mantle 1 pack of mantle 1.9 µSv/h
Accessories	Pendant	U-238	0.006 - 1.01 kBq	2.81 mSv/y
		Th-232	0.041 - 6.96 kBq	
		K-40	20 - 687 Bq	
	Bracelet	U-238	11 - 146 Bq	1.2 mSv/y
		Th-232	46 - 980 Bq	
		K-40	72 - 101 Bq	
	Necklace	U-238	10 - 246 Bq	1.22 mSv/y
		Th-232	85 - 1682 Bq	
		K-40	30 - 221 Bq	
	Energy card saver	U-238	0.03 - 0.36 kBq	1.35 mSv/y
		Th-232	0.3 – 2.55 kBq	
		K-40	0.03 - 0.284 kBq	
	Quantum shield sticker	U-238	up to 55 Bq	less than 1 mSv/y
		Th-232	up to 300 Bq	
		K-40	up to 170 Bq	
	Incorporating radioluminous paint (Nite GlowRing)	U-238	1.2 Bq	less than 10 µSv/y
		Th-232	3.5 Bq	
Thoriated tungsten welding rods	Tungsten rod	Th-232	30 - 135 Bq/g	0.98 mSv/y
Healthcare products	Ion Paint	U-238	1.67 - 2.4 kBq/kg	1.51 mSv/y
		Th-232	15.6 - 31.8 kBq/kg	
		K-40	1.41 - 2.96 kBq/kg	
	Undergarment	U-238	2 - 175 Bq	1.57 mSv/y
		Th-232	15 - 1732 Bq	
		K-40	29 - 207 Bq	
	Glass disc	U-238	0.44 – 0.81 kBq	0.92 µSv/h 2.16 mSv/y
		Th-232	3.26 – 7.41 kBq	
		K-40	0.2 - 0.55 kBq	
	Cosmetic products	U-238	0.023 – 6.9 Bq/g	less than 1 mSv/y
		Th-232	0.02 – 15.6 Bq/g	
		K-40	0.22 – 31 Bq/g	
	Sanitary pad	U-238	2.6 – 11.5 Bq	less than 1 mSv/y
		Th-232	8.7 – 26 Bq	
		K-40	13.6 – 81 Bq	
Tourmaline therapy	Spa stone	U-238	3 - 49 Bq	less than 10 µSv/y
		Th-232	9 - 138 Bq	
		K-40	23 - 878 Bq	
	Body patch	U-238	0.07 – 33 Bq	less than 1 mSv/y
		Th-232	0.18 – 63 Bq	
		K-40	0.33 – 738 Bq	
Dentures	Acrylic Resin Teeth	U-238	up to 10 Bq/g	less than 1 mSv/y
		Th-232	up to 15 Bq/g	
		K-40	up to 70 Bq/g	
Gaseous tritium light sources (GTLS)	Tritium Gas Tube Self Luminous Outdoor Camping	H-3	Dose rate 0.21 µSv/h	0.42 mSv/y
Deodorizer and Dehumidifier	Deodorizer and Dehumidifier	U-238	0.02 – 0.3 Bq/g	less than 1 mSv/y
		Th-232	0.12 – 1.3 Bq/g	
		K-40	0.3 – 2.4 Bq/g	

Consumer Product

Conclusion

We propose the revision of the existing guidelines on the LEM/TEK/69 for the regulatory control of consumer products containing radioactive substances. These findings serve as a foundation for harmonizing regulatory control in Malaysia. It advises authorities on prior authorization procedures, control criteria, requirements for manufacturers and importers, as well as labelling.

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