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List of Officer from DRDE, Gwalior for COVID-19, Emergency Preparedness

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1. HAND SANITIZER (As per WHO Guideline)

Specification :

Formulation - 1

Content (v/v)

2-Propanol	:	75.15%,
3% H_2O_2	:	4.17%
98% Glycerol	:	1.45%
DI Water	:	19.23%

Formulation 2

Content (v/v)

96% Ethanol	:	83.33%,
3% H_2O_2,	:	4.17%
98% Glycerol	:	1.45%
DI Water	:	11.05%

Conditions for the manufacturing and supply of hand sanitizer

1. Firm can produce the sanitizer under the name DHR by following WHO guidelines.
2. Firm will have to put label on the product where the DRDO monogram along with QA/QC controlled by DRDE, Gwalior.
3. The states/places far away from Gwalior can get quality control by NABL accredited laboratories and qualified sample analysis reports need to be submitted to Director, DRDE, Gwalior.
4. The qualified batches are only allowed to be supplied.
5. The price of DHR sanitizer has been frozen by a cost estimation committee approved by competent authority. In this regard no firm can sell the DHR more than Rs 100/L ex factory excluding packaging, bottling, taxes and transportation.
6. DRDE, Gwalior is not responsible for any approvals required to operate the industry for manufacturing and supply of DHR sanitizer.
7. DRDE is not responsible for the other terms and conditions imposed by industries.
8. DRDE is not responsible to arrange any raw material for the manufacturing and supply of DHR.
9. DRDE is not responsible for the release of payment against the sale and supply of DHR sanitizer.
10. Remaining any other queries, Director DIITM, DRDO HQ, Rajaji Marg, New Delhi can be contacted.

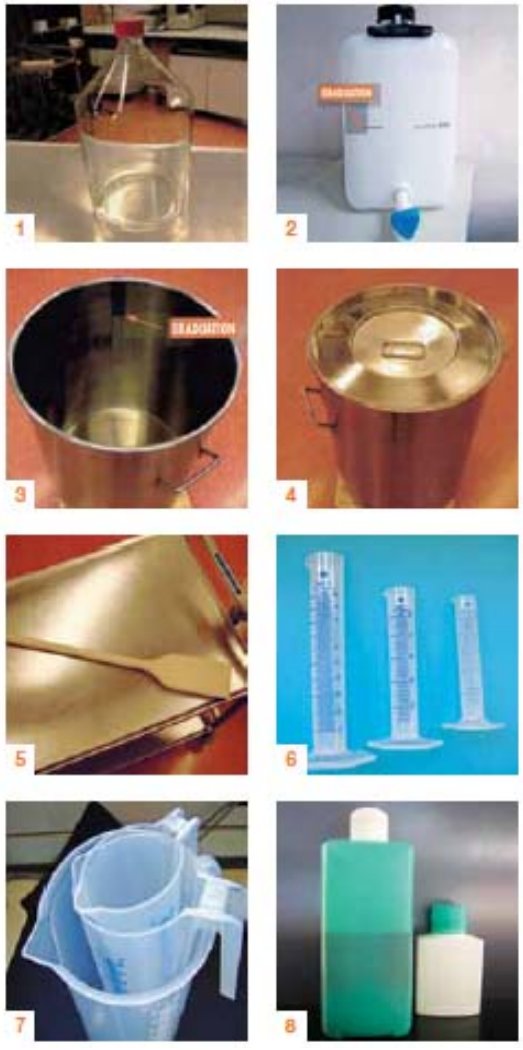
Guide to Local Production:
WHO-recommended Handrub Formulations

(2-propanol based)

REAGENTS FOR FORMULATION

- Isopropyl alcohol 99.8%
- Hydrogen peroxide 3%
- Glycerol 98%
- Sterile distilled or boiled cold water (RO water <50 TDS)

- 10-litre glass or plastic bottles with screw-threaded stoppers (**1**), or 50-litre plastic tanks (preferably in polypropylene or high density polyethylene, translucent so as to see the liquid level) (**2**), or Stainless steel tanks with a capacity of 80–100 litres (for mixing without overflowing) (**3** , **4**)
- Wooden, plastic or metal paddles for mixing (**5**)
- Measuring cylinders and measuring jugs (**6** , **7**)
- Plastic or metal funnel
- 100 ml plastic bottles with leak-proof tops (**8**)
- 500 ml glass or plastic bottles with screw tops (**8**)



METHOD: 10-LITRE PREPARATIONS

These can be prepared in 10-litre glass or plastic bottles with screw-threaded stoppers.

• Isopropyl alcohol 99.8%:	**7515 ml**
• Hydrogen peroxide 3%:	**417 ml**
• Glycerol 98%:	**145 ml**
• Water:	**1913 ml**
Total	**10,000 ml**

Step by step preparation:

1. The alcohol for the formula to be used is poured into the large bottle or tank up to the graduated mark.

4. The bottle/tank is then topped up to the 10-litre mark with sterile distilled or cold boiled water.

5. The lid or the screw cap is placed on the tank/bottle as soon as possible after preparation, in order to prevent evaporation.

2. Hydrogen peroxide is added using the measuring cylinder.

6. The solution is mixed by shaking gently where appropriate or by using a paddle.

3. Glycerol is added using a measuring cylinder. As glycerol is very viscous and sticks to the wall of the measuring cylinder, it should be rinsed with some sterile distilled or cold boiled water and then emptied into the bottle/tank.

7. Immediately divide up the solution into its final containers (e.g. 500 or 100 ml plastic bottles), and place the bottles in quarantine for 72 hours before use. This allows time for any spores present in the alcohol or the new/re-used bottles to be destroyed.

Production and storage facilities:

- Production and storage facilities should ideally be air conditioned or cool rooms. No naked flames or smoking should be permitted in these areas.

- WHO-recommended handrub formulations should not be produced in quantities exceeding 50-litres locally or in central pharmacies lacking specialised air conditioning and ventilation.

- Since undiluted alcohol is highly flammable and may ignite at temperatures as low as 10°C, production facilities should directly dilute it to the above-mentioned concentration. The flashpoints of isopropyl alcohol 75% (v/v) are 17.5°C and 19°C, respectively.

- National safety guidelines and local legal requirements must be adhered to the storage of ingredients and the final product.

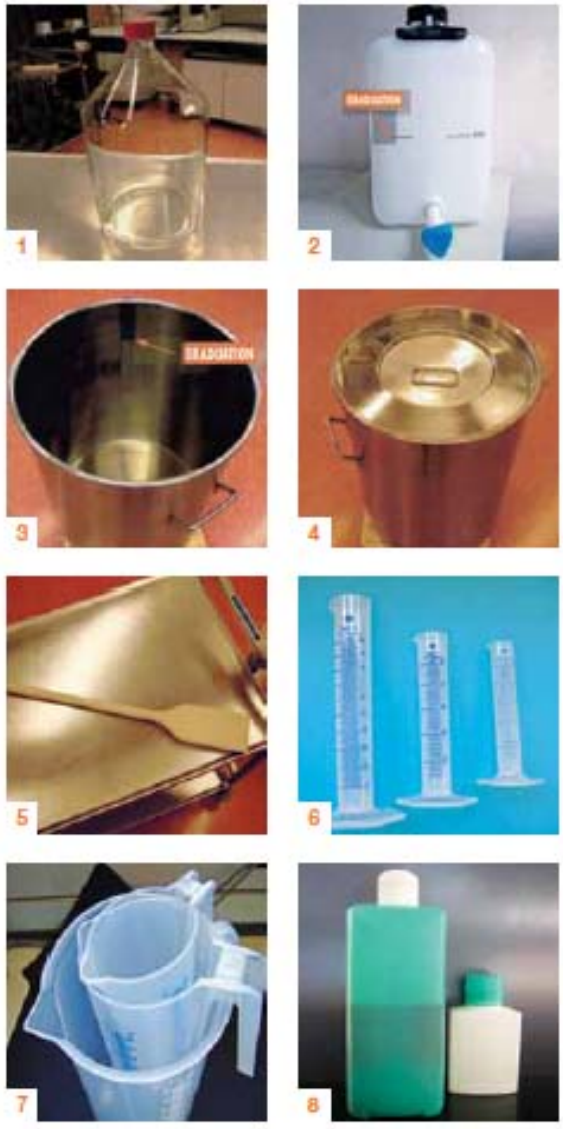
Guide to Local Production:
WHO-recommended Handrub Formulations

(Ethanol based)

REAGENTS FOR FORMULATION

- Ethanol 96%
- Hydrogen peroxide 3%
- Glycerol 98%
- Sterile distilled or boiled cold water (RO water < 50 TDS)

- 10-litre glass or plastic bottles with screw-threaded stoppers (**1**), or 50-litre plastic tanks (preferably in polypropylene or high density polyethylene, translucent so as to see the liquid level) (**2**), or Stainless steel tanks with a capacity of 80–100 litres (for mixing without overflowing) (**3** , **4**)
- Wooden, plastic or metal paddles for mixing (**5**)
- Measuring cylinders and measuring jugs (**6** , **7**)
- Plastic or metal funnel
- 100 ml plastic bottles with leak-proof tops (**8**)
- 500 ml glass or plastic bottles with screw tops (**8**)



METHOD: 10-LITRE PREPARATIONS

These can be prepared in 10-litre glass or plastic bottles with screw-threaded stoppers.

• Ethanol 96%:	**8333 ml**
• Hydrogen peroxide 3%:	**417 ml**
• Glycerol 98%:	**145 ml**
• Water:	**1105 ml**
Total	**10,000 ml**

Step by step preparation:

1. The alcohol for the formula to be used is poured into the large bottle or tank up to the graduated mark.

4. The bottle/tank is then topped up to the 10-litre mark with sterile distilled or cold boiled water.

5. The lid or the screw cap is placed on the tank/bottle as soon as possible after preparation, in order to prevent evaporation.

2. Hydrogen peroxide is added using the measuring cylinder.

6. The solution is mixed by shaking gently where appropriate or by using a paddle.

3. Glycerol is added using a measuring cylinder. As glycerol is very viscous and sticks to the wall of the measuring cylinder, it should be rinsed with some sterile distilled or cold boiled water and then emptied into the bottle/tank.

7. Immediately divide up the solution into its final containers (e.g. 500 or 100 ml plastic bottles), and place the bottles in quarantine for 72 hours before use. This allows time for any spores present in the alcohol or the new/re-used bottles to be destroyed.

Production and storage facilities:

- Production and storage facilities should ideally be air conditioned or cool rooms. No naked flames or smoking should be permitted in these areas.

- WHO-recommended handrub formulations should not be produced in quantities exceeding 50-litres locally or in central pharmacies lacking specialised air conditioning and ventilation.

- Since undiluted alcohol is highly flammable and may ignite at temperatures as low as 10°C, production facilities should directly dilute it to the above-mentioned concentration. The flashpoints of ethanol 80 (v/v) is 19°C.

- National safety guidelines and local legal requirements must be adhered to the storage of ingredients and the final product.

Quality control

1. Pre-production analysis should be made every time an analysis certificate is not available to guarantee the titration of alcohol (i.e. local production). Verify the alcohol concentration with the alcoholmeter and make the necessary adjustments in volume in the preparation formulation to obtain the final recommended concentration.

2. Post-production analysis is mandatory if either ethanol or an isopropanol solution is used. Use the alcoholmeter to control the alcohol concentration of the final use solution. The accepted limits should be fixed to ± 5% of the target concentration (75%–85% for ethanol).

3. The alcoholmeter shown in this information pamphlet is for use with ethanol; if used to control an isopropanol solution, a 75% solution will show 77% (± 1%) scale at 25°C.

Testing Procedures :

- The sanitizers are tested for antimicrobial activity based on contact time with sanitizer and reduction in log count of both gram positive and gram negative bacteria and Bacteriophage (virus simulant) lysis.
- The alcohol percentage is estimated based on alcoholmeter/hydrometer.
- H_2O_2 % is estimated based on volumetric titration.

SPECIFICATION FOR ADVANCED FACE MASK (Bio -Protective)

SN	Parameters	Requirement/Test Method/ Standard	Specified Value	Remarks/Test Places
1.	**Design Features**	• Design of the mask - Flat & fold with Exhalation valve • No interference with mask while wearing goggles. • One-way exhalation valve to facilitate longer wearing with low exhalation resistance. • Provision of Aluminium nose Clip for Snug Fit. • The elastic head band with adjustable fittings should be attached (adhesive/ultrasonic/RF welding/stitching) with the mask		
2	**Size**	Free Size		
3	**Filtration Medium**	(a) The mask material is required to be multilayered nonwoven fabrics, Total : 200 gsm (max.) (b) The configuration of different layers of the mask can be: Layer 1: Outer side 40 gsm non-woven Layer 2: Non woven with nanoweb as per 3c: Mass 20 gsm max. Layer 3: 100 gsm non-woven Layer 4: Non-woven with nanoweb as per 3c: Mass 20 gsm max. Layer 5: Inner side 20 gsm non-woven The mass of layer no. 1, 3 and 5 are flexible within the total 200 gsm and meeting all the specified parameters. (c) Silver impregnated nylon nanoweb of 0.35gsm (min.) to be deposited on polypropylene melt blown nonwoven fabric (max 20 gsm): **Certificate required from supplier/ATIRA Ahmedabad.**		NABL accredited/Govt. Approved lab

4	Biological Filtration efficiency, % Min	ASTM F 2101	99.7	NABL accredited/Govt. Approved lab/ SITRA
5	Particulate removal efficiency, %	0.3 micron (µm) size particulate matter	>99.0%	DRDE/NABL accredited/Govt. Approved lab
6	Breathing (inhalation) Resistance @30 lpm, Max		100 Pa	NABL accredited/Govt. Approved lab
7	Exhalation valve leakage test	As per NIOSH procedure :TEB-APR-STP-004 or Equivalent	Leakage shall not exceed 30 ml per minute	NABL accredited/Govt. Approved lab
8	Mass (With fitted Accessories & without packing), grams, Max		15.0 g	NABL accredited/Govt. Approved lab
9	Life	Shelf life Usage Life	12 months Single use	Certificate from Industry
10	Packing	Mask is required to be packed in polyethylene pouch along with moisture adsorbent (silica gel pouch) and user instructions and month and year of manufacture.		

Note: Industry has to submit the compliance certificate/reports to the above specification.

Configuration – Suggested, only for reference:

Testing Resources:

Sr. No. 5 Breathing Resistance using DOP – DRDE, Gwalior

Core Filter Material – Nano web based non woven filter developed in collaboration with ATIRA, Ahmadabad: Available from ATIRA (Contact person: Ms. Deepali Palawat: 9868160909/8076915085)

1. BIO PPE (Bio protective coverall with shoe cover)

Specification of Bio-protective Coverall

Specification No- DRDE/Bio-Coverall / Specn.-II/2020 Date – 28 March 2020

Reference: (i) Min of Health & Family Welfare, DGHS (Emergency Medical Relief) Letter No –Z.28015/17/2020-EMR Dated 02 March 2020

(ii) Min of Health & Family Welfare, DGHS (Emergency Medical Relief) Novel Coronavirus Disease 2019 (COVID-19): Guideline on rational use of personal protective equipment received from DRDO HQ on 26th March 2020.

Sl. No.	PARAMETERS	TEST METHOD	Specified Value	Remark/Test Place
1.	Fabric Mass, Gram per Square Meter (gsm)	ASTM D 3776 (other equivalent test method)	65-110	NABL/Govt approved Lab
2	Tensile Strength, N/5cms,Min Machine Direction(MD) Cross Direction(CD)	EN 29073-3(other equivalent test method)	 80 40	NABL/Govt approved Lab
3	Elongation,% (Both the Directions),Min	EN 29073-3(other equivalent test method)	40	NABL/Govt approved Lab
4	Resistance to liquid Penetration, Pressure in cm water Column, Min	EN20811(other equivalent test method)	100	NABL/Govt approved Lab
5	Synthetic blood penetration test	ISO 16603 class 3 or equivalent	No Penetration	NABL/Govt approved Lab/DRDE, Stitched/sealed Joints samples will also be tested
6	Dry Bacterial Penetration Resistance Test (Resistance to penetration by biologically contaminated solid particles)	ISO 22612 (2005)	Class 3 (Highest class) Penetration (log cfu) ≤ 1	NABL/Govt approved Lab/DRDE
7	Colour	Visual	White, light Blue or light yellow	Visual
8	Shoe Cover	Each Bio-protective Coverall to be provided with a Pair of shoe cover made of the same material as that of Bio-protective Cover all with elastic on the top for fitment and grip. The shoe covers are of 2 sizes 1 & 2. Size 1 shoe cover is to be packed with M size Coverall/suit, fitting over the Indian shoe size of 8 and size 2 shoe cover is to be packed with L size coverall/suits, fitting over the Indian shoe size of 11.		
9	**Garment type** a. Single Overall type garment with integrated hood (designed to match the head contour) with elastic around face opening. Front zipper with lock slider and the Zipper should be covered with a storm flap with provision of self adhesive sealing.			

	b. Elastic is also required on wrist & lower leg area. c. Seam length should be minimum possible. Manufactured out of material specified above.
10	**Garment sizes** 2 Sizes Medium (M), Large (L) as per Min of Health & Family Welfare, DGHS (Emergency Medical Relief) Novel CoronaVirus Disease 2019 (COVID-19): Guideline on rational use of personal protective equipment.
11	**Usage Life of the coveralls**: Single use
12	**Fabrication**: Sewing/ Adhesion/ thermal/RF welding /Ultrsonic welding or any other suitable technique or combination of techniques followed by application of Sealing tape in stitched area. The sealing tape should be hot air adhesive type made out of suitable material such that the fabricated joint withstands the Synthetic Blood penetration test, Minimum width of the tape should be 16 mm. Thumb & Finger Loop (One loop in each sleeve To anchor the sleeve in place) made of thin elastic tape.
13	**Packing and Storage** a. Each coverall to have a label stuck /printed /embossed on suit itself regarding Size, month & year of manufacturing, manufacturer name and "as per DRDE,Gwalior Specification". **b.** Each coverall along with a pair of shoe cover of specified size is required to be packed in clean and transparent Polyethene Pouch, sealed at the mouth, in clean condition and must have a coloured printed paper inlay or printing on polythene for information regarding manufacturer, month & year of manufacturing, Instruction regarding usage, storage, disposal, "Manufactured on DRDO Order", as per DRDE,Gwalior Specification. c. Storage Condition: To be stored under standard packing and storage conditions (Temperature: 25 ± 2^0C and RH:65±5%) d. Storage Life: 5 years in standard packing, under the specified storage conditions.

Note: Product to be made in neat and clean environment. Vendor to give certificate in this regards.

GARMENT CONFIGURATION/IMAGE ONLY FOR REFERENCE (Specified parameters/garment features mentioned in the specification are to be met):

TESTING RESOURCES:

SITRA Coimbatore: All specified parameters of specs.

DRDE Gwalior: S. No. 5 of specs synthetic blood penetration

ATIRA Ahmadabad: S. No. 1-4.

SUGGESTED MATERIALS:

Material selection is industry choice to meet the specified parameters.

Many materials can be used for bio protective coverall. These can be selected based on availability and specified properties of suit. The present specs. does not limits use of any specific materials. The specification only defines performance parameters. However, few material options are suggested below for reference:

(i) Three layered laminated fabric with central layer of SMS type non woven of approx. 50 gsm and microporous breathable PE films on both sides each of approx 20 gsm.

(ii) Approx 20 gm monolithic film in centre and outer side 45-50 gsm SMS type PP non woven water repellent and inner side 20-30 gsm SS/SMS non woven.

(iii) Three layered laminated fabric with central layer of SMS type non woven of approx. 50 gsm and PE films on both sides each of approx 20 gsm .