Biomedical waste materials are as follows

- Used Needles
- Syringes
- Blood and Blood Bags
- Urine Collection Bags
- Glucose Bottles
- Bandages
- Chemicals
- Drugs

Harmful Effects Of Biomedical Wastes

- Biomedical wastes are bio-hazardous in nature as they are infection causing and pathological in nature.
- These kinds of wastes are vectors of number of diseases so they promote the growth of different pathogens causing contamination and infection.
- They are the sources of spreading dreadful infectious diseases such as Acquired Immune Deficiency Syndrome (AIDS), Hepatitis B, Septicemia and other life threatening infections.

Various rules under BMW (M&H) rules 2011

The Bio Medical Waste (Management & Handling) Rules, 2011 consists of 17 rules along with 6 schedules and 6 application forms formats (BMW Rules, 2011).

Rule No. Content

- Rule 1 Short title
- Rule 2 Application
- Rule 3 Definitions
- Rule 4 Duties of the Occupier
- Rule 5 Duties' of the operator of a common bio-medical waste treatment facility
- Rule 6 Responsibilities of authorities

Various rules under BMW (M&H) rules 2011

The Bio Medical Waste (Management & Handling) Rules, 2011 consists of 17 rules along with 6 schedules and 6 application forms formats (BMW Rules, 2011).

Rule No. Content

- Rule 8 Segregation, packaging, transportation and storage
- Rule 9 Prescribed authority
- Rule 10 Procedure for authorization
- Rule 11 Advisory Committee
- Rule 12 Annual report

Various rules under BMW (M&H) rules 2011

The Bio Medical Waste (Management & Handling) Rules, 2011 consists of 17 rules along with 6 schedules and 6 application forms formats (BMW Rules, 2011).

Rule No. Content

- Rule 13 Maintenance of records
- Rule 14 Accident reporting
- Rule 15 Appeal
- Rule 16 Common disposal or incineration sites
- Rule 17 Liability of the occupier or operator of a facility

Various schedules under BMW (M&H) rules 2011

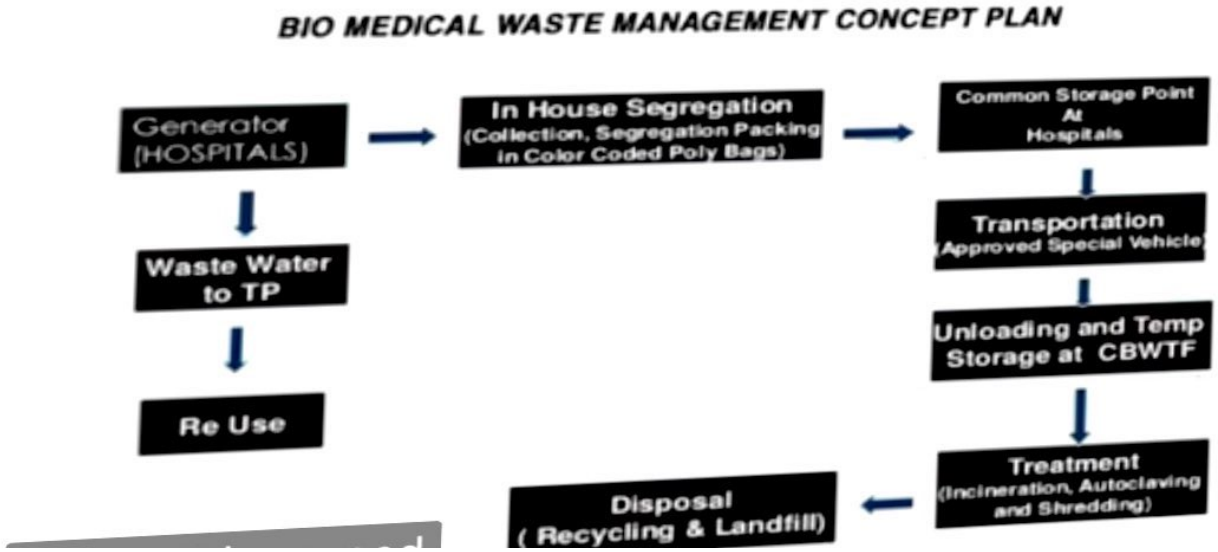
Schedule No. Related rules Content

- Schedule I Rule 4, 7 Different category of Biomedical waste
- Schedule II Rule 8 Colour coding and types of container to be used for the disposal of biomedical waste
- Schedule III Rule 8 Labelling for biomedical waste containers/ bags
- Schedule IV Rule 8 Labelling for transportation of biomedical waste containers/ bags

Various schedules under BMW (M&H) rules 2011

- Schedule V Rule 7, schedule I Standards for treatment of disposal of BMW
  - i. Standards for incinerators
    - (a): Operating standards
    - (b): Emission standard
  - ii. Standards for waste autoclaving
  - iii. Standards for liquid waste
  - iv. Standards for microwaving
  - v. Standards for deep burial.

Various schedules under BMW (M&H) rules 2011



IMPLEMENTATION OF BIO-MEDICAL WASTES HANDLING RULES

Application of Biomedical Wastes Handling Rules:

- It is applicable to all those who generate, receive, collect, transport, store, treat and dispose Bio - Medical Waste in an approved manner.
- Hospitals, clinics, Nursing Homes, Dispensaries, laboratories, Veterinary Institutions, Animal Houses, Blood Banks, Medical Colleges, Forensic and Research Labs.

Exempted Areas or Not Applicable to:

- Radioactive wastes under Atomic Energy Act-1962 C.
- Hazardous Chemicals Rules 1989 (Manufacture Storage and Import).
- Solid Wastes under Municipal solid wastes rules 2000.

IMPLEMENTATION OF BIO-MEDICAL WASTES HANDLING RULES

- Batteries Rules 2001.
- Hazardous Wastes Rules 2008.
- E-Waste Rules 2011.
- Hazardous Microbes.
- Genetically modifies microorganisms and the cells enclosed under manufacture, import, use, export, storage of hazardous microbes, genetically engineered microbes of cell rules 1989.

Treatment And Disposal

- Bio-medical waste must be treated and discarded in accordance with Schedule I and with the standards approved in Schedule V.
- Where required each occupier, must set up according to the time-schedule in the Schedule VI. Obligatory bio-medical waste treatment facilities like incinerator, microwave system for the treatment of waste and autoclave make certain mandatory treatment of waste at the general waste treatment facility or any other waste management facility.

Category	Type of waste	Types of Bags	Treatment & Disposal
YELLOW	A) Human anatomical waste - tissue, organs body parts, fetus B) Animal anatomical waste Experimental animal body parts, organs tissues	Yellow coloured non-chlorinated bags. *(Chlorinated bags produce dioxin during burning so non chlorinated bag is used)	Incineration or Plasma Pyrolysis or deep burial.
RED	Contaminated waste (Recyclable) tubing, bottles, intravenous tubes, catheters, urine bag syringes	Red coloured non-chlorinated bags or containers	Autoclaving microwaving hydroclaving followed by shredding
White (Translucent)	Sharp waste, metals syringes with fixed needle, scalpels, blades, that may cause puncture	Puncture Proof Leak Proof temper Proof	Autoclaving dry heat sterilization followed by shredding

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White (Translucent)	Sharp waste, metals syringes with fixed needle, scalpels, blades, that may cause puncture	Puncture Proof leak Proof temper Proof	Autoclaving dry heat sterilization followed by shredding

BLUE	Glassware expect cytotoxic waste	Cardboard with blue coloured marking.	Disinfection Autoclaving microwaving hydroclaving and than for recycle.

The following procedures for the disposal of various types of biomedical wastes are as follows

- **Incineration :** Incineration is a controlled combustion process in which the waste is completely oxidized and microorganisms, if present are destroyed and denatured at high temperature
- **Autoclaving:** Autoclaving is a low-heat thermal process in which steam is brought into contact with the waste under pressure for a sufficient duration of time.
- **Microwaving:** Microwave ovens having radiation frequency between 300MHz and 300, 0000 MHz are used for treating waste.
- **Shredding:** In shredding, waste is cut into smaller blocks and disinfected. The shredded material is then stored in landfills.

The following procedures for the disposal of various types of biomedical wastes are as follows

- **Secure landfills:** A secure landfill is a specially designed pit (of dimension 50x50x 10m3) from which hazardous wastes cannot escape into open air or mix with groundwater. The sides of the pit are lined with an impermeable membrane such as plastic. The solid waste is carefully placed in the pit, spread out and compacted with heavy machinery. The waste is then covered with a layer of compacted soil. The process is repeated till the pit is full. It is then closed by cement concrete.

- **Deep well injection:** Deep well injection is a technology of disposing waste, mostly liquid, in which treated or untreated water is poured through pipes running down several thousand feet from the ground level. The water is injected into highly saline regions under the earth so that the contaminants do not migrate to pollute freshwater aquifers.

Segregation, Packaging, Transportation And Storage

- Bio-medical waste must not be mixed with other wastes.
- Bio-medical waste should be isolated in the containers or bags at the source of generation in compliance with Schedule II. It is done prior to its storage, transport, treatment and final disposal. The containers must be appropriately labeled as prescribed in Schedule III.
- In case the container is transported from the location of biomedical waste generation to any waste management facility outside the site, the container must be separate from the label approved in Schedule III. It shall also carry information prescribed in Schedule IV.

- In spite of anything contained in the Motor Vehicles Act, 1988, or rules there under, the untreated biomedical waste must be transported only in prescribed vehicle as may be sanctioned for the purpose by the competent authority as specified by the government of India.

- The biomedical waste which is not treated must not be kept stored beyond the period of 48 hours, unless in any case it becomes obligatory to store the waste beyond that period. The authorized person shall take consent the approved authority and take actions to make certain that the waste does not negatively affect human health and the environment.

Standards For Treatment And Disposal Of Bio- Medical Wastes

Standards For Incineration:

- Operating Standards such as Combustion Efficiency shall be at least 99.00%.
- The operating Temperature for the primary chamber is minimum of 800°C and secondary chamber minimum 1050°C + or - 50°C.
- The gas residence time in secondary chamber should be at least two seconds.
- Emission Standards: For Particulate matter, Nitrogen Oxides (NO) and hcl, Dioxins and Furans and Mercury (Hg) and its compounds.

Standards For Treatment And Disposal Of Bio- Medical Wastes

- Stack Heights should be 30 meters above the ground level.
- In addition to this Schedule – II deals with the operating standards for gasification and plasma pyrolysis, air emission standards, air pollution control measures, disposal of ash vitrified material, standards for autoclaving of bio-medical wastes, validation test for autoclave, recording of operational parameters, routine test, spore testing, standards of microwaving, standards for deep burial, Standards for efficacy of chemical disinfection, standards for dry heat sterilization and Standards for liquid waste.

- **SCHEDULE-III**

  Deals with PRESCRIBED AUTHORITIES AND THEIR CORRESPONDING DUTIES

- **SCHEDULE-IV**

  Part-A: Deals with Label for Bio-Medical Waste Containers or Bags

  Part-B: Label for Transporting Bio-Medical Waste Bags or Containers

  Form-I: Deals with Accident Reporting.

  Form-II: Deals with Application for Authorization or Renewal.

  Form-III: Deals with Authorization.

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  Form-III: Deals with Authorization.

  Form-IV: Deals with Annual Report.