



सत्यमेव जयते

(Govt. of India)
(Ministry of Railways)

Question Bank On Bio - Toilet System

CAMTECH/2014-15GW1/M/Question Bank

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Indian Railways
Centre for Advanced Maintenance Technology

MAHARAJPUR, GWALIOR—474005

Question Bank on Bio-Toilet System

Q.1 What is Bio-Toilet?

Ans. A toilet in which biological degradation of human waste by inoculums takes place.

Q.2 How does biodegradation of human waste take place?

Ans. Inoculums digests the human waste converting it into water & gases in the process.

Q.3 What is the name of Bio-toilet Bacteria?

Ans. Anaerobic Bacteria

Q.4 What do you mean by 99% . Pathogens inactivation in anaerobic biodegradation?

Ans. It means out of 100 bacteria, only 1 bacterium will survive.

Q.5 Whether anaerobes can degrade detergents/ phenyl etc?

Ans. Yes.

Q.6 What are the steps in anaerobic digestion?

Ans. Large polymers are converted into simpler monomers called hydrolysis

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Simple monomers are converted into volatile fatty acids called acidogenesis

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Volatile fatty acids are converted into acetic acid CO₂ & H₂ called acetogenesis

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Acetate & H₂ are converted into CH₄ & CO₂ called methanogenesis

Q.7 What is the life of Anaerobic bacteria ?

Ans. Their survival is linked with the availability of nutrients/ feed material. Even if the feed material is not available, bacteria survive but do not multiply/reproduce. And as soon as nutrients are available they again start multiplying.

Q.8 What is the doubling period for bacterial population ?

Ans. Doubling time of bacteria in the biodigester vary from 30 minutes to 16 hours among the bacteria involved in different steps of bio-degradation.

Q.9 Are coaches turned out from PUs filled with bacteria and how much quantity?

Ans. Must be turned out after filling **120 lts. Inoculum** in the Bio-Toilet tank.

Q.10 Is there need to top-up bacteria in in-service coaches?

Ans. Generally, it is not required. Requirement can be assessed by results only.

Q.11 What is the frequency for doing sample testing of effluent?

Ans. 90 Days (On 5% of total coach holding)

Q.12 How much quantity of inoculum is charged initially in the Bio-Toilet tank?

Ans. 120 Lts Inoculum

Q.13 Whether Anaerobic bacteria is harmful to human beings or not?

Ans. It should not be consumed. Hands to be cleaned after charging of bacteria in toilet.

Q.14 What are the tests to be carried out by depot and what are their frequency?

Ans. pH value test, TS, TDS & TVS tests to be carried out by cog. Depots with the frequency of 90 days.

Q.15 What will be the effect if pH value of effluent is dropped between 1 to 5?

Ans. Discharged effluent will be Acidic & can cause corrosion on track fittings.

Q.16 How much time it takes in doubling its population?

Ans. *30 minutes to 16 hours*

Q.17 How many tests to be carried out on Inoculum?

Ans. pH value test, Bio-Gas production, Methane % test & MPN count.

Q.18 Why is chlorinator provided?

Ans. Chlorinator is provided to disinfect the discharged water which reduces the E-coli form present in effluent.

Q.19 What is the weight and cost of KMnO₄ tablet ?

Ans. 80 gms & cost approx-Rs. 42. Still under optimization phase

Q.20 What is the weight & cost of Chlorine tablet?

Ans. 100g; Approx Rs 130/-

Q.21 What is the safe space available between two tanks to pass fitters?

Ans. Approx. 600 mm.

Q.22 What is the thickness of the body sheet for Bio-digester tank ?

Ans. 3 mm S.S. Sheet.

Q.23 Thickness of sheet in inside partition is?

Ans. 2 mm S.S. Sheet.

Q.24 What is the weight of empty Bio-Toilet Tank?

Ans. Approx. 115 Kg.

Q.25 Flow of human waste from Ist and last chamber is passed through?

Ans. 62.5 mm riser pipe only.

Q.26 What is the size of ICF coach Bio-digester?

Ans. 540 mm x 1150 mm x 720 mm with 4 mounting brackets & 2 Nos. M16 bolts on each bracket.

Q.27 What is the size of LHB coach Bio-digester?

Ans. 547 X 580 X 1680 mm (H X W X L)

Q.28 What is the total volume of Bio-Toilet tank ?

Ans. 400 Lts.

Q.29 What is the effective volume of Bio-Toilet tank?

Ans. 300 Lts.

Q.30 What is the height of Bio-Toilet tank from Rail level?

Ans. 225 mm

Q.31 Flow of human waste from Ist and last chamber is passed through?

Ans. Piping arrangement.

Q.32 What is the thickness of poly grass mat, provided on partition wall ?

Ans. Approx. 10 to 15 mm.

Q.33 What is the size of compartment No.1?

Ans. 271 mm x388 mm x538 mm.

Q.34 What is the thickness of positive mounting bracket ?

Ans. 05 mm thick

Q.35 What is full name of TPE connector?

Ans. Thermoplastic Polyurethane material

Q.36 What is the criteria for design of the Bio-Toilet tank ?

Ans. 1/2 of volume of waste of total population in coach (Approx 250 gm human waste +2.5 Lts flushing water per passenger).

Calculation:

100 passengers in one SCN(72) X (250 gms human waste) = 25Kg.+25 Lts.
Water=50 Lts.

Existing size of Compartment No. 1= 271 X 388 X 538 mm = 56 Lts. Volume
Proposed enhancement of Comp.1= 421 X 388 X 538 mm = 87.88 Lts. Volume
(The existing size of comp-4, 293 X 388 X 538 mm is proposed to be reduced)

Q.37 Which design of bio-digester tank to be followed by PUs/Workshops/Depots/MLR?

Ans.

1. With **J-Bracket type** mounting- Fitted by RCF till December'13.
2. With **C-type mounting brackets** (mounting brackets integrated with tank)
- Cut-in by RCF since Jan'14.(400 tanks fitted)
3. **Direct Mounting** - Positive mounting with bolted fastening.

Q.38 What are the toilet cleaning instructions ?

Ans. Given in AMOC Doc. No. RDSO/2010/CG/CMI-03 Rev-01 Dec.2011

Q.39 What are the cleaning agents and in how much quantity?

Ans. Available in CAMTECH Comp. page No.17 & 18

Q.40 What equipments to be available at depots for testing?

Ans. Given in the Hand Book on Test Scheme circulated by CAMTECH.

Q.41 What is to be done in POH ?

Ans. Bio-Digester should be dismantled, checked & cleaned and refitted.

Q.42 What are the guidelines for AMOC?

Ans. Given in AMOC Doc. No. RDSO/2010/CG/CMI-03 Rev-01 Dec.2011

Q.43 What are the guidelines for Field trial & testing scheme?

Ans. Given in CAMTECH's compendium page 104, Rev-4 October-2012

Q.44 What are the books & Manuals available on RDSO website for Bio-Toilet?

Ans. 1. Compendium of Instructions on Bio-Toilet System

2. Hand Book on Test Scheme

3. Pamphlet on Bio-Toilet System

Q.45 Who is organising Training in Bio-Toilet system for officers and staff?

Ans. CAMTECH/Gwalior (Every month)

Q.46 What are the instructions for carrying out POH of Bio-Toilet Coaches?

Ans. See RDSO letter No.MC/CB/LF/Anaerobic dated 08.06.2012.

Q.47 What are the instructions for carrying out Retro fitment of Bio-Toilet tanks?

Ans. See RDSO letter No.MC/CB/LF/Anaerobic dated 21.06.2012.

Q.48 Any Video film is developed by CAMTECH on Bio-Toilet System?

Ans. Yes, developed by CAMTECH, available on RDSO website

Q.49 What is the identification of Bio-Toilet Coach?

Ans. Green band on exterior below toilet glass

Q.50 What is JWG. What is the frequency of meeting?

Ans. Joint Working Group . Quarterly meetings. Convener is CDE/RCF.

Q.51 Why six compartments have been made in Bio-digester tank ?

Ans. **For giving sufficient time for growth of Bacteria in green grass pads.**

Q.52 Whether any list of cleaning agents available for Bio-Toilet coaches?

Ans. Given in CAMTECH's Compendium Page No. 17.

Q.53 How choking of P-Trap is removed ?

Ans. With the help of Choke Remover device.

Q.54 How many staff have been given training by CAMTECH up to June 2014?

Ans. Approx. 1000 (Staff & officer)

Q.55 Whether standardisation of sticker for Bio-Toilet done or not?

Ans. Yes, Standardised, RDSO Drawing No. CG-14044.

Q.56 How garbage of toilet pan is removed in case of pan choking?

Ans. With the help of **“Garbage picking Tongs”**.

Q.57 How many Bio-Toilet labs are available on Indian Railways?

Ans.

- At coaching depot Sarai Rohilla, N.Rly.
- At coaching depot Gwalior, NC Rly.
- At coaching depot Secunderabad, SC Rly.

Q.58 How many environmental laboratories are available in India ?

Ans. 27 Govt. laboratories.(List is given in handbook on Testing Scheme)

Q.59. How garbage of Bio-Toilet Tank compartment No.1 is removed in case of blockage of comp.1.?

Ans. With the help of Sewage suction Machine **“Evacuation machine”** as per CAMTECH spec No. Camtech/M/Suction system/03/11 dated 30.09.2011. The machine is available at MIB/W/NGP.

Q60 Why do bio toilets get choked?

Ans. Bio-Toilets get choked mainly on account of throwing of waste like tea cup, water bottle, napkin etc inside toilet by travelling passengers.

Q. 61 How to tackle the problem of chocking in bio-toilets?

Ans.

- Chocking in bio toilets could be avoided by educating the travelling public about Bio-toilet. A short film on bio toilet is developed by CAMTECH. This film should be shown respectively at stations & waiting hall to educate passengers.
- Announcement to be made at regular interval at all stations requesting passengers not to throw any waste material inside toilet as this results in chocking of bio-toilets.
- Stickers as shown in compendium page no 169, must be displayed in all bio toilets to educate the passengers.
- Dust bin must be provided in all bio toilets so that passengers could dump waste in the dustbin.