PREVENTION OF COMMUNICABLE DISEASES IN DENTAL PRACTICE

INFECTION CONTROL STRATEGIES

Control of Microorganisms:

Dental staff are exposed to a wide variety of infectious microorganisms.

The most important communicable diseases of concern to dentists are:

Viral Diseases:

1. Upper respiratory tract infection.
2. Mumps - Rubella - Measles.
3. Herpes virus
4. Hepatitis virus
5. Human immunodeficiency virus (HIV) (AIDS).
6. Swine Flu.

Bacterial Diseases:

As : Tuberculosis, syphillis, Diphteria … etc.

Fungal Diseases: As Candida infections

I-Before patient treatment.

1- Careful medical history
2-Disposable coverings of countertops and surfaces
3-Disinfect prostheses and appliances
4-Hand scrubbing and washing
5-Protective barriers
6-Reducing spread of microorganism

II-After patient treatment

A- Preparing instruments for sterilization

A- Decontaminating Instruments With An Ultrasonic Cleanser

2- Wrapping instruments

3- Instrument transfer

B-Sterilization:

1- heat sterilization

Moist heat sterilization Dry heat sterilization

2- Cold sterilization

I-Before patient treatment.

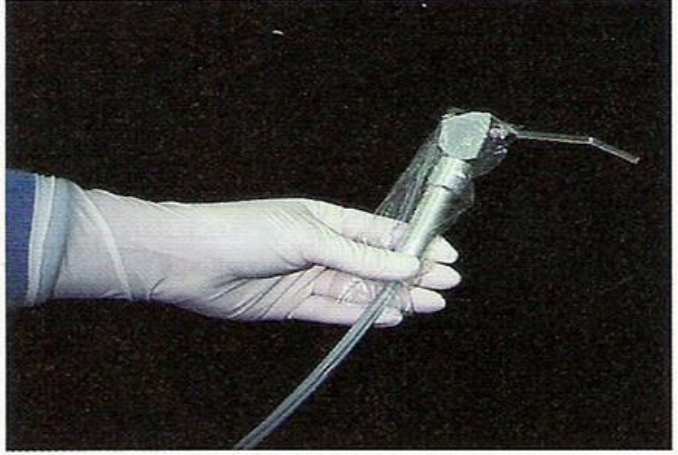
1- Careful medical history:

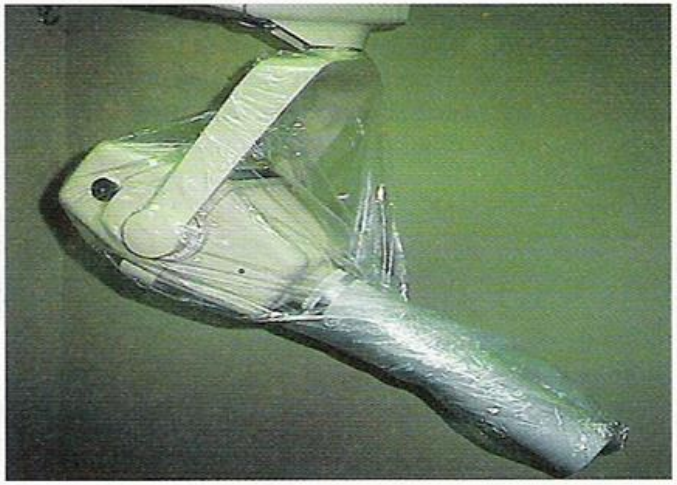
Careful attention should be given to ***infectious diseases*** as AIDS, hepatitis, T.B. syphilis, pharyngitis.

Also Special attention for ***high risk groups*** as patients undergoing renal dialysis, patients treated with frequent blood transfusion, drug abusers and homosexuals.

2-Disposable coverings of countertops and surfaces:

Impervious-backed paper, foil, or clear plastic wrap may be used as disposable covers for the dental unit, light switch and handles of bracket tables, receptables for handpecies, air syringe, control switches, saliva ejector, chair arms.





3-Disinfect prostheses and appliances

Dental prostheses and orthodontic appliances received from the dental laboratory should be washed with detergent, disinfected and rinsed before it is placed in the patient's mouth.

4-Hand scrubbing and washing:

There is **transient bacteria** under the finger nails and around the nails. special brush used to clean thoroughly under the nails.

The washing should continue to all sides of the fingers, hands, Wrists and lower arms for 6 minutes, this is followed by the use of an antiseptic solution.

5-Protective barriers:

1-Face masks protect the dentist from inhalation or ingestion of aerosols carrying bacteria and viruses. It remove up to 99% of bacteria in dental aerosols.

N.B. viral hepatitis may become an airborne infection during dental treatment.

2-Protective Eye-glasses:

should be worn to prevent physical injuries (accidental dropping of an instrument or filling materials) and infection (aerosol or splatter) of the eyes.

3-Full Face Shield

It is plastic or Acrylic Full Face coverage used to protect all face against physical injuries and infection.




4- Disposable gloves:

Hands should always be washed after removing the gloves.

5-Gowns, laboratory coats, or uniforms should be worn and should be changed daily or when visibly soiled with blood, using hot water and laundry detergent.








6-Reducing spread of microorganism

1- Placing Of A Rubber Dam should be used to isolate the working area from the rest of mouth.



2- A High-Suction evacuation system. The aspirator tip should be placed close to the working area for the greatest efficiency.



3- Rinsing The Work Area With Water Followed By Air rather than use of water spray to create less splatter of blood and saliva.

4- avoiding the use of brushes for polishing and prophylaxis. use of Rubber polishing point and prophylaxis cups minimize the creation of droplets and aerosols.

5-Avoid injuries from sharp instruments:

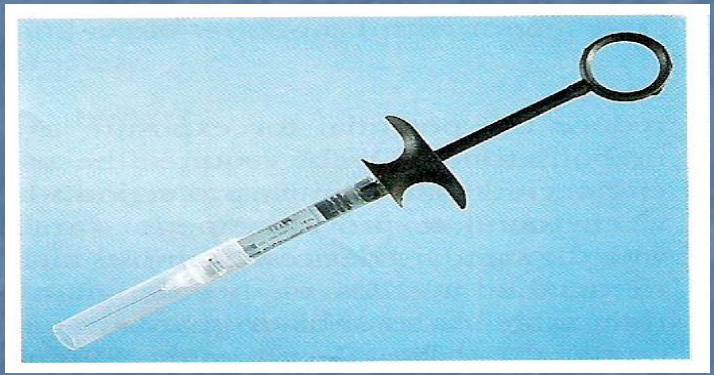
The following ***precautions*** should be followed:

*Point the sharp ends away from yourself and you're assistant.

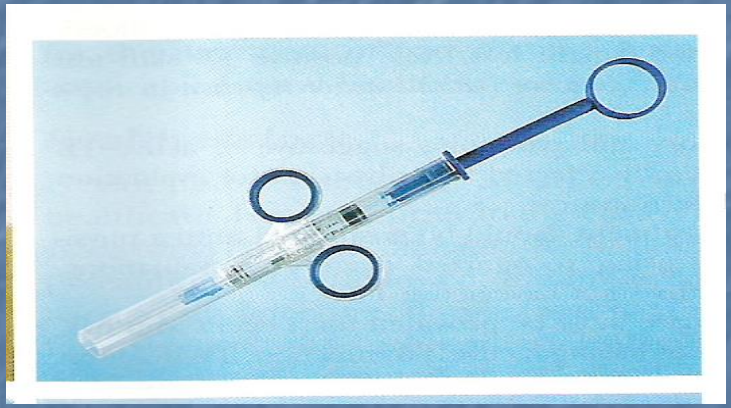
*Avoid picking up sharp instruments by the handful.
*Keep fingers out of the way of rotating Instruments.

*Dispose of used needles and other sharp Items securely.
* Never try to recap or bend disposable needles.

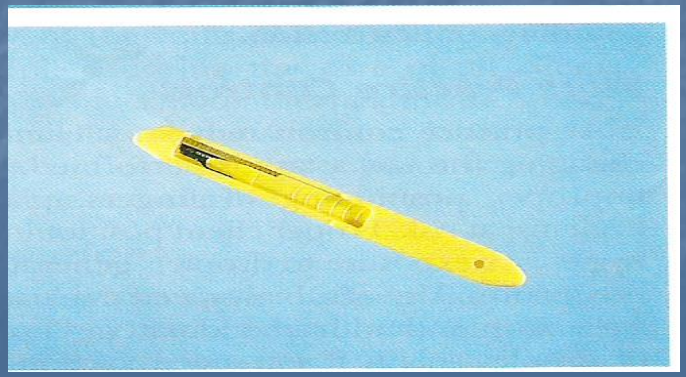
Sharps container with biohazard label warning.



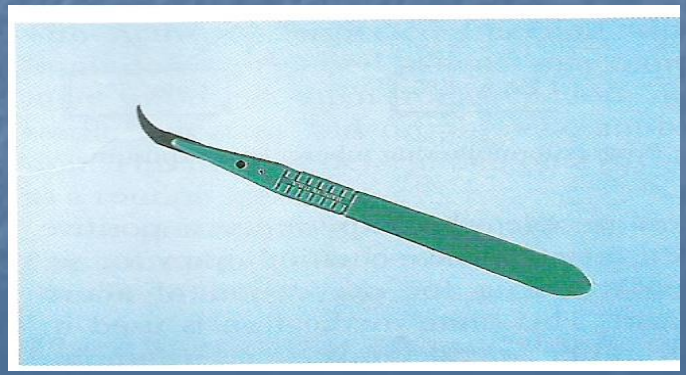
Disposable dental safety syringe.



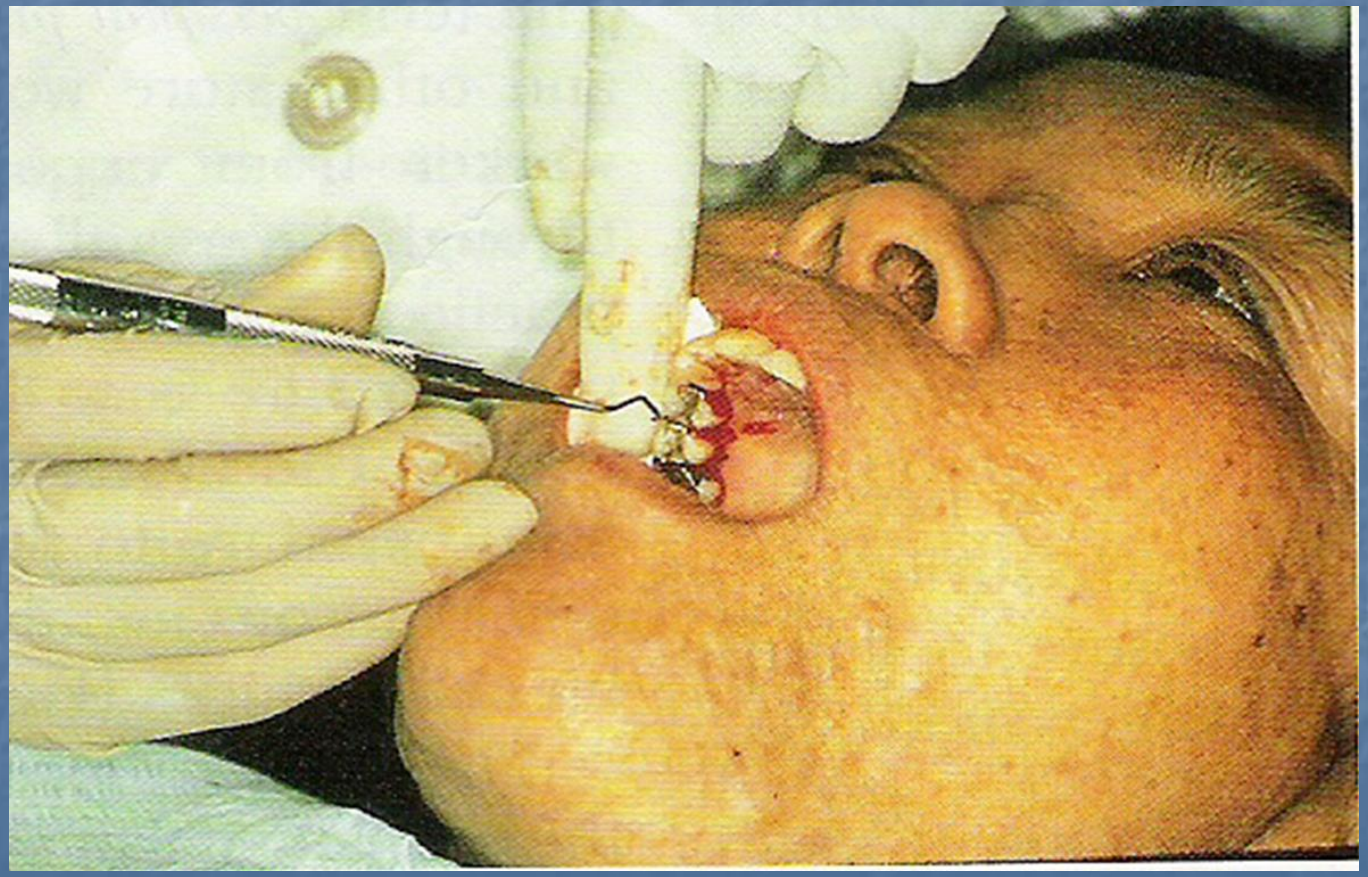
Reusable dental safety syringe with disposable needle.



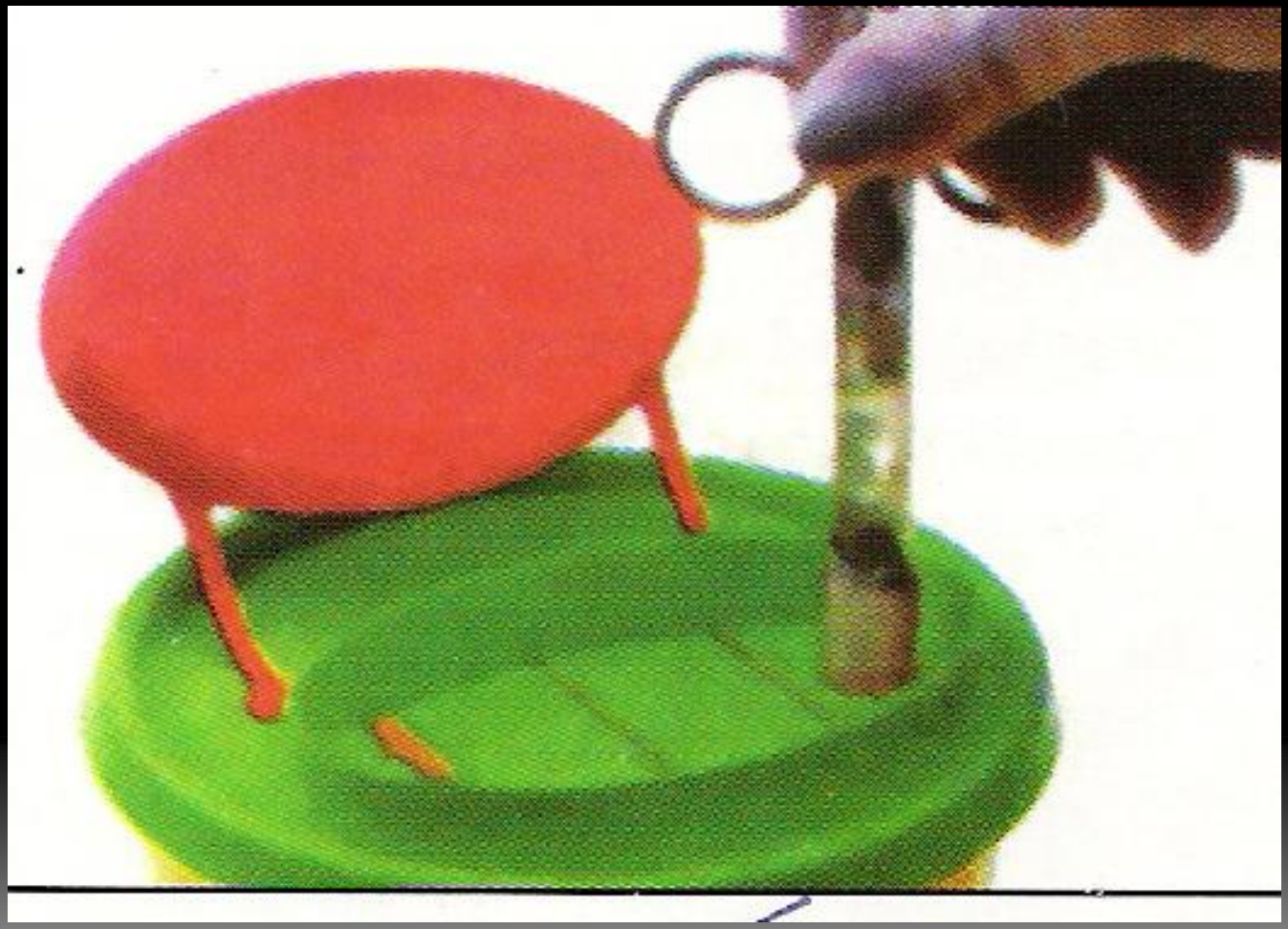
Safety scalpel with retractable blade.



Disposable scalpet with blade.



Needle destroyer



Risk from needle stick injuries

- A survey conducted in Egypt revealed that almost 70% of all HCP have been exposed over their lifetime to needle stick injuries.
- Studies from other countries reve
  overall needle stick & sharps inj
  (NSSI) rate of 33 per 1000 HCP.
  highest proportion of exposures was
  to nurses.

II-After patient treatment

Preparing instruments for sterilization

A- Decontaminating Instruments With An Ultrasonic Cleanser Prior To Sterilization

It is the mechanical and chemical cleaning. Any instrument that is to be sterilized must be prepared by thorough immersion in a disinfecting solution (avoid drying of organic material and trapping germs) cleaning (washed in a soapy water, using a brush with a handle) rinsing and drying.

N.B. 1-The disinfecting solution should be changed every day and for every patient set.

2-The operator should wear heavy rubber gloves and handle sharp Instruments carefully.

3-Ultrasonic cleaner can be used for mechanical cleaning and processing prior to sterilization.





2- Wrapping instruments:

Unless an instrument will be used immediately after sterilization it should be wrapped in a paper or plastic bag that can withstand the condition of sterilization.



3- Instrument transfer

To maintain a chain of asepsis in preparing the tray for treatment, ***sterile supplies*** should be transferred to the bracket table by means of ***transfer forceps*** rather than with fingers (to avoid pathogenic bacteria transmittable by the hands)

Sterilization

All items used intraoral should be sterilized routinely using a acceptable means of sterilization.

Methods of sterilization:

It could be classified into :

1- heat sterilization

Moist heat sterilization (autoclave & chemoclve).

Dry heat sterilization (hot oven, rapid heat transfer type and glass bead sterilization).

2- Cold sterilization

(chemicals disinfectants, ethylene oxide gas & gamma radiation).

The autoclave
(steam under pressure)

It is used at a temperature of 121°C and pressure of 15 to 20 psi for 15 to 20 minutes.

Advantages:

The most reliable, quick and efficient method for sterilization of wide variety of materials.

Disadvantages:

a) can **not be used for oils, greases, powders and heat sensitive materials.**

b) May **rust metal instruments** if precautions (use of anti rust solutions as 1 % sodium nitrite or by commercial oil-water antirust agent) are not taken.

c) **May dull cutting edges**.

2-Chemoclave

As autoclave but Use Alcohol, formaldehyde & Ketone (chemical vapor) instead of water at 127° C and 20 psi for 20 minutes.

3-Dry heat oven:

Used at 160^0 C – 170^0 C for 1-2 hour.

Advantage:

1.Large capacity

2.Does not dull cutting edges.

3.Only methods for sterilization of oils greases and powder.

4.Does not corrode metals.

5.Simple to operate.

Disadvantage:

- Requires longer time for sterilization.
- Can not be used on some heat sensitive materials.

4-Rapid heat transfer type

sterilization at 190^0C for 8-15 min.

Not cause corrosion, short cycle

may cause damage soldering and heat sensitive instruments

5- Steel balls/ Glass beads sterilization

Heating steel balls or glass beads at 210-230^{0}C for 10-30 sec. in small chamber container contain small steel balls & glasses pieces (useful for burs, root canal instruments & small instruments.

Cold sterilizations

6-Ethylene oxide gas:

It is used at 60 ^{0}C for 2 - 3 hours or at room temperature for 12 hours. Most dental supplies and instruments can be sterilized by ethylene oxide gas.

Advantage:

a)Sterilization of ***hand pieces*** that can not be autoclaved.

b) **Sterilization of heat sensitive item**

Disadvantage:

a.Irritation to eye and nose.

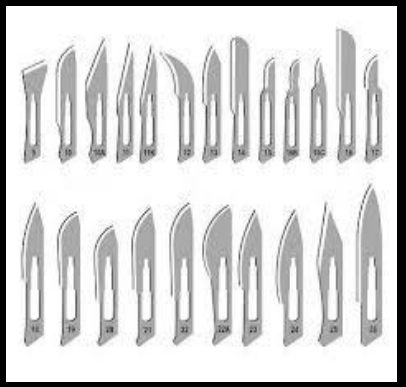
b.longer sterilization time.

c.Expensive equipments.

d.Porous materials must be exposed to air several hours to rid them of the toxic gas.

7-Gammma radiation

Used In manufactures for specially for heat & moist sensitive materials as rubber, powder,… but expensive and need special equipments and precaution.



8-Disinfection

Many materials cannot be exposed to high heat so should be disinfected and sterilized using chemical disinfectant.

They may produce ***high and intermediate-level of disinfection***, depending on the length of immersion.

Chemical disinfectants

1-Chlorine solutions

2- Formaldehyde

3-Glutaraldehyde

4- Iodophors

1-Chlorine solutions

such as sodium hypochlorite (household bleach) usually contain 5.25 % hypochlorite solution.

It is used for disinfection of surfaces ranges from I part bleach: 10 parts water to I part bleach : 100 parts water depending on the degree of contamination.

A dilution of I: 10 is recommended for prosthesis.

Immersion time ranges from 10-30 min., not more because of the instability of sodium hypochlorite.

Solution must be freshly prepared and discarded after use.

One major disadvantage is that it is highly corrosive to some metals.

Mechanism of action of chlorine:

When chlorine is added to water it forms hydrochloric acid and hypochlorus acid.
Hydrochloric acid is neutralized by alkalinity of water.
Hypochlorus acid is mainly responsible for disinfection of water.

When pH exceeds 8.5, hypochlorus acid gets ionized into hypochlorite ions which are weak disinfectants than hypochlorus acid.
So chlorine acts as best disinfectant when pH of water is around seven because of high concentration of hypochlorus acid.

2- Formaldehyde

It is a colorless, flammable gas that has a suffocating odor.

It kills microorganisms by chemically damaging the proteins and nucleic acid of the organism.

High level of disinfection can be obtained with 8% solution in water or in 70% alcohol, while a 3% solution in water gives an intermediate level of disinfection in 30 minutes.

disadvantages:

a-Suffocating odor.

b-irritating to skin, eyes, and oral and respiratory tissues.

c-Incompatibility with some materials.

3-Glutaraldehyde

kills microorganisms by damaging their proteins and nucleic acids.

The disinfectant comes in two containers and it is activated when the prescribed amounts of each are mixed.

Activated solutions have a shelf life of 14 to 30 days to 3 years depending on the formulation.

It can disinfect in 10 minutes at room temperature and sterilization can be achieved after 7 hours to 10 hours, depending on the formulation.

Disadvantage:

1. Long immersion time.
2. Destruction of hepatitis virus is probable but not proven.
3. May corrode carbon steel after 24 hours of immersion
4. It is irritant to skin and eyes.
5. Extensive use on exposed surfaces releases irritant gas.

4- Iodophors:

These are **detergents** to which **iodine quickly binds and is slowly released**.

Iodine **produces intermediate level of disinfection** in about **10 to 30** minutes.

A convenient method is to use pads saturated with diluted iodophor to wipe a specific area. The liquid is allowed to dry and any residue is removed with a pad wetted with70% alcohol.

On using a disinfectant, consider the following:

1. The heavily contaminated instruments or materials should not be disinfected without pre-cleaning.
2. Use heavy duty gloves Protection of hands during cleaning.
3. Use of ultrasonic cleaners is important in this regard.
4. All surfaces should be pre-cleaned before disinfection.
5. Not to use a solution for too long time.
6. Followed the manufacturer's instructions.
7. Disinfectants should not be mixed together with other cleaning agents.