

## Semi-automatic $^{99m}\text{Tc}$ solvent extraction system



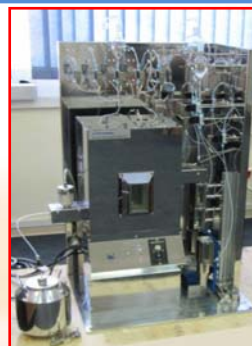
### Technical characteristics of semi-automatic $^{99m}\text{Tc}$ solvent extraction system

| Power requirements   | Compressed air supply (in-house utility or air compressor) | Mass     |
|----------------------|--|----------|
| 220 V, 50/60 Hz, 3 A | 80-90 psig   | ≈ 350 kg |

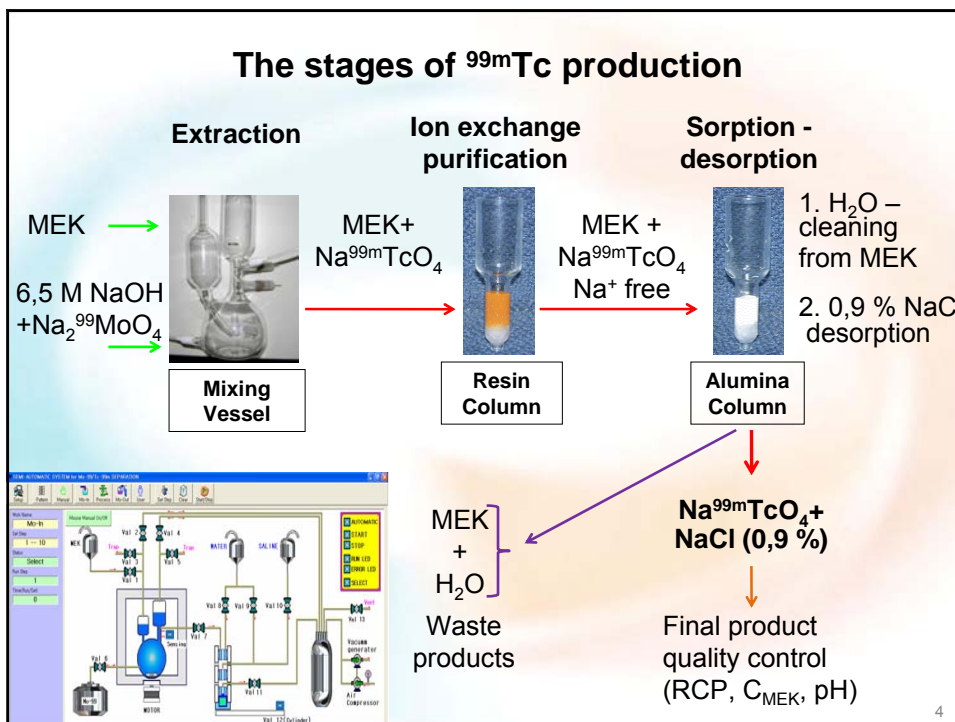
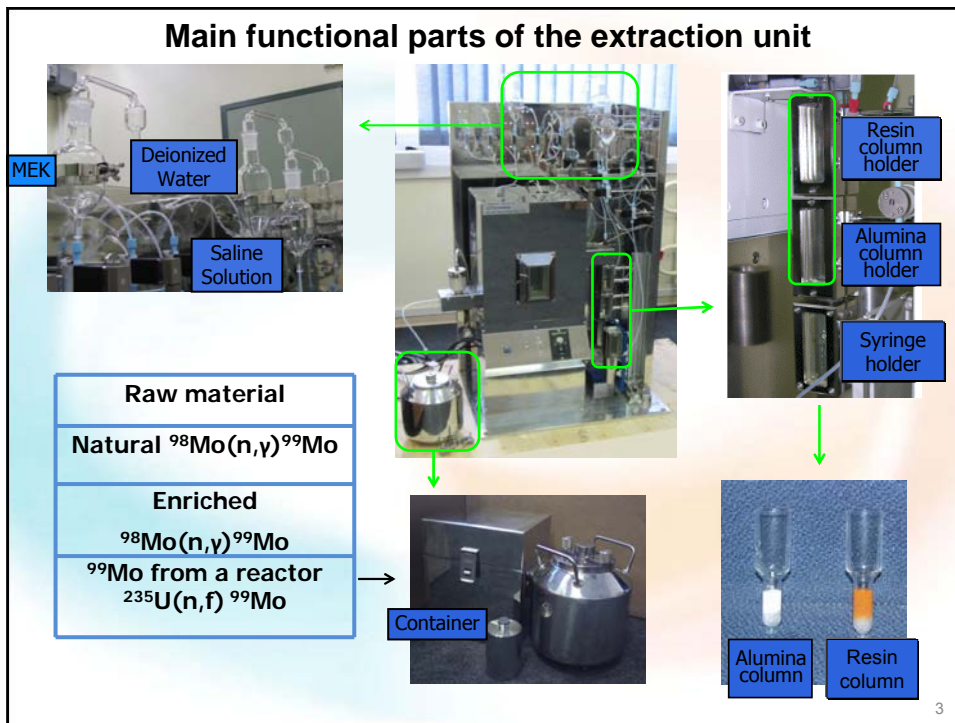


Control Unit

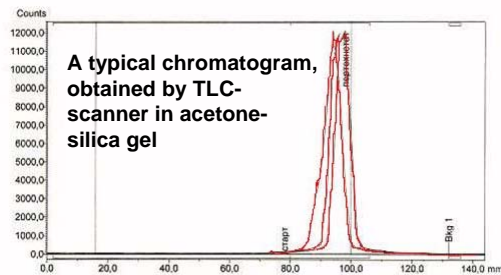
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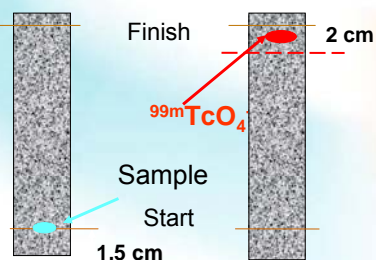
Operational Unit



## Characteristics of sodium pertechnetate, $^{99m}\text{Tc}$



### Thin-layer chromatogram (TLC)



### Test results for the extraction generator

| RCP, % | pH  | $C_{\text{MEK}}^*$ , mg/ml | Sterility |
|--------|-----|----------------------------|-----------|
| 99,0   | 6,9 | < 0,5                      | sterile   |
| 99,1   | 6,5 | < 0,5                      | sterile   |
| 99,0   | 7,3 | < 0,5                      | sterile   |
| 99,4   | 6,9 | < 0,5                      | sterile   |
| 99,0   | 6,8 | < 0,5                      | sterile   |
| 99,7   | 7,1 | < 0,5                      | sterile   |
| 99,1   | 7,5 | < 0,5                      | sterile   |
| 99,2   | 6,3 | < 0,5                      | sterile   |

### Quality standards for chromatographic and extraction generators

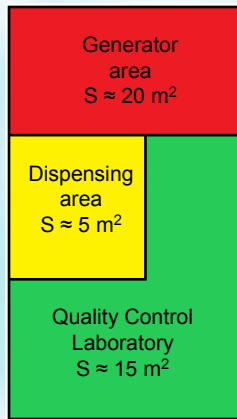
| RCP, %   | pH      | $C_{\text{MEK}}^*$ , mg/ml | Sterility |
|--|---------|----------------------------|-----------|
| Chromatographic generator                            |         |                            |           |
| >99,0  | 4,0-7,5 | -                          | sterile   |
| Extraction generator                                 |         |                            |           |
| >99,0  | 6,0-7,5 | < 0,5                      | sterile   |
| $C_{\text{MEK}}^*$ - residual of methyl ethyl ketone |         |                            |           |

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## Quantity obtained of $\text{Na}^{99m}\text{TcO}_4$

| Activity on the date of filling |                          |                           | 296 GBq      |
|---------------------------------|--------------------------|---------------------------|--------------|
| Time of delivery                |                          |                           | 1 day        |
| Day                             | $A_{\text{Mo-99}}$ , GBq | $A_{\text{Tc-99m}}$ , GBq | doses* / day |
| <b>1 week</b>                   |                          |                           |              |
| Mon                             | 231                      | 173                       | 233          |
| Tue                             | 178                      | 133                       | 179          |
| Wed                             | 139                      | 104                       | 140          |
| Thu                             | 110                      | 82                        | 110          |
| Fri                             | 83                       | 62                        | 83           |
| <b>Total per first week</b>     |                          |                           | <b>745</b>   |
| <b>2 week</b>                   |                          |                           |              |
| Mon                             | 65                       | 49                        | 66           |
| Tue                             | 50                       | 38                        | 51           |
| Wed                             | 38                       | 29                        | 39           |
| Thu                             | 30                       | 22                        | 29           |
| Fri                             | 24                       | 18                        | 24           |
| <b>Total per second week</b>    |                          |                           | <b>209</b>   |
| <b>Total per two weeks</b>      |                          |                           | <b>954</b>   |
| *1 dose= 740 MBq                |                          |                           |              |

## Equipment and premises for semi-automatic $^{99m}\text{Tc}$ solvent extraction system



| Nº                                | Operations  | Equipment   |
|-----------------------------------|---|---|
| <b>GENERATOR AREA</b>             |   |   |
| 1                                 | Production of sodium pertechnetate ( $^{99m}\text{Tc}$ )        | Semi-Automatic $^{99m}\text{Tc}$ Solvent Extraction System ( $^{99m}\text{Tc}$ generator) |
| <b>DISPENSING ZONE</b>            |   |   |
| 1                                 | Dispensing  | Dispenser   |
| 2                                 | Production of radiopharmaceuticals with $^{99m}\text{Tc}$ -kits | Water bath  |
| <b>QUALITY CONTROL LABORATORY</b> |   |   |
| 1                                 | pH measurement of solutions                                     | Lab pH-meter  |
| 2                                 | Measurement of $^{99m}\text{Tc}$ output                         | Dose calibrator   |
| 3                                 | Determination of residual MEK                                   | Spectrophotometer   |
| 4                                 | Weighing  | Analytical balance  |
| 5                                 | Production of deionized water                                   | Deionizator of water  |
| 6                                 | Sampling  | Microdoser  |
| 7                                 | Reagent Storage   | Fridge  |
| <b>ADDITIONAL EQUIPMENT</b>       |   |   |
| 1                                 | Satisfying GMP specifications (generator and dispensing areas)  | Laminar box (class C-A)   |
| 2                                 | Control of radioactive contamination of personnel and premises  | Dosimeter, radiometer   |

## The advantages of the semi-automatic $^{99m}\text{Tc}$ solvent extraction system

- Larger amounts of  $^{99m}\text{Tc}$  of high quality can be produced
- extracted  $\text{Na}^{99m}\text{TcO}_4$  has  $\text{pH} \approx 6,0 \div 7,5$ , which will ensure high quality of radiopharmaceuticals prepared with "cold" kits;
- three types of Mo material (natural, enriched or fission) can be used;
- the design of the extraction system allows installed it in a clinic;
- the volume of eluate can be varied to have certain specific activity throughout the week of processing a Mo batch;
- isotope pharmacies with centralized delivery of radiopharmaceuticals in the form of «Unit Dose Service» can be set up.



Working with radioactive substances must be carried out in accordance with the rules and regulations established by the radiation safety in your country.



**Julia Reshetnik – engineer**  
**E-mail: UNReshetnik@runtech.ru**

**Thank you for your attention**

**LLC «Center «Atommed»**  
**115230 Moscow, Varshavskoe avenue, b.46**  
**Tel.: +7 (495) 232-03-45**  
**<http://atommedcenter.ru>**