

**ENTRY NO:** C-18  
**Machine Name:** VARIABLE ENERGY CYCLOTRON  
**Date:** 6/1/01 9:16:46 AM  
**Institution:** VARIABLE ENERGY CYCLOTRON CENTRE  
**Address** 1-AF BIDHAN NAGAR, CALCUTTA-700064, INDIA  
**In Charge of Cyclotron:** BIKASH SINHA  
**Telephone:** +91 33 3371230  
**Fax:** +91 33 3346871  
**Person Reporting:** N K MUKHOPADHYAY  
**Web:** vecal.ernet.in  
**E-mail:** nkm@veccal.ernet.in

## HISTORY

**Designed By:** inhouse  
**Construction Dates:** 1969-77  
**First Beam Date:** June 1977

## CHARACTERISTIC BEAMS

ions	/ energy(MeV/N)	/current(pps)	/power(w)
p	30	9E13	
d	30	1.2E14	
alpha	80	3E13	
Oxygen	8	3.6E11	
Neon	7	3E11	

## transmission efficiency(source to extract beam)

**typical:** 1 for external ECR Source% - **best:** %

## transverse emittance

### emittance definition:

**vertical:** 17 (90%) $\pi$  mm mrad  
**horizontal:** 22 (90%) $\pi$  mm mrad  
**longitudinal:** ( $\Delta$ ) E/E)%xdeg RF

## USES

**basic research:** 25%      **therapy:** %  
**development:** 20%      **isotope production:** %  
**other:** %      **maintenance:** 30%  
**beam tuning:** 25%      **Total Time:** 5500(Average)h/year

## TECHNICAL DATA

**a)magnet:**      **type:** compact  
    **Kb:** 130MeV/A    **Kf:** 70MeV/A  
**average field (min/max):** 1.7 T  
**number of magnet sectors:** 3  
    **hill angular width:** hill angular width  
    **spiral (max):** 55 max deg  
**pole parameters**  
    **diameter:** 2.24 m  
    **injection radius:** m  
    **extraction radius:** 0.99 m  
**hill gap:** 0.19m    **valley gap:** 0.30m  
**trim coils**  
    -number: 17x2  
    -current(max): 2500 A-turns  
**harmonic coils**  
    -number: 5xNsectorsx2  
    -current(max): 300 A-turns  
**main coils**  
    **number:** 1x2  
    **total ampere-turns:** 560000 A-turns  
    **current:** 2800 A  
**stored energy:** MJ  
**weight - iron:** 275t    coils: t  
**power**  
    **main coils (total):** 392 kW  
    **trim coils (total max):** 250 kW  
    **refrigerator (cryogenic):** kW  
**b)RF**  
**acceleration**

**frequency range:** 5.5-15.5MHz  
**harmonic modes:** 1,3  
**number of dees:** 1 with Dummy Dee  
**number of cavities:** 1  
**dee angular width:** 180degrees  
**voltage**  
    at injection: kV(peak to ground, max)  
    at extraction: kV(peak to ground, max)  
    peak: 60kV(peak to ground, max)  
**line power(max):** 300kW  
**stability**  
    **phase:** deg  
    **voltage:** 0.2%  
**injection**  
**c)ion source:** PIG, ECRIS  
**external injection:** axial  
    **components:** 90degree Analysing magnet,Quadrupoles,2x45degree bending Magnet,glasser lenses  
    **source bias voltage:** 8-10kV  
    **injection energy:** MeV/N  
    **buncher:** First harmonic,Double Drift  
**injection efficiency:** 15%  
**d)injector:**  
**e)extraction**  
2 Electrostatic deflectors  
**efficiency**  
    **typical:** 20%  
    **best:** 25%

## f)vacuum

**pumps:** Oil Diffusion, Cryopanel (under test)  
**achieved vacuum:** 2.6E-4Pa

## REFERENCES

Int. Cyclotron Conf. Proc. 2001,1998,95,92,89,86,84,78,75,72

## EXPERIMENTAL FACILITIES

915mm Scattering chamber,Target and Detector Lab.,Electronic module,Radiochemistry,Radio-Isotope Lab.,ISOL System,Rabbit,Online Data analysing computer.

## COMMENTS