



# Vulcan 84

*Automated Digestion & Work-Up Station*

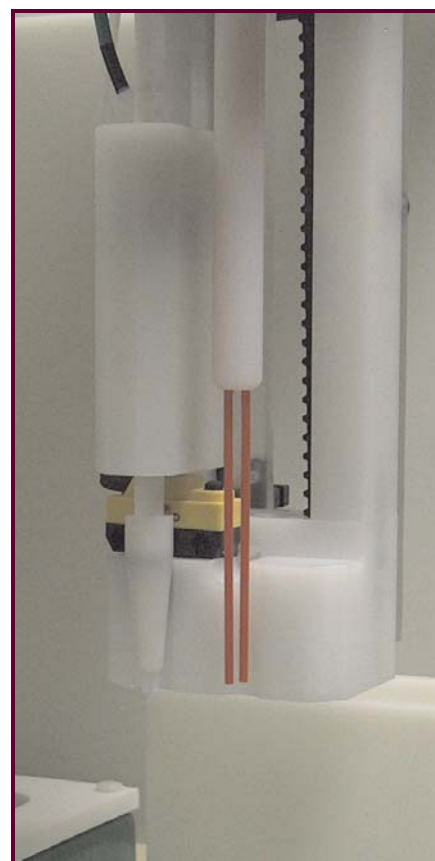


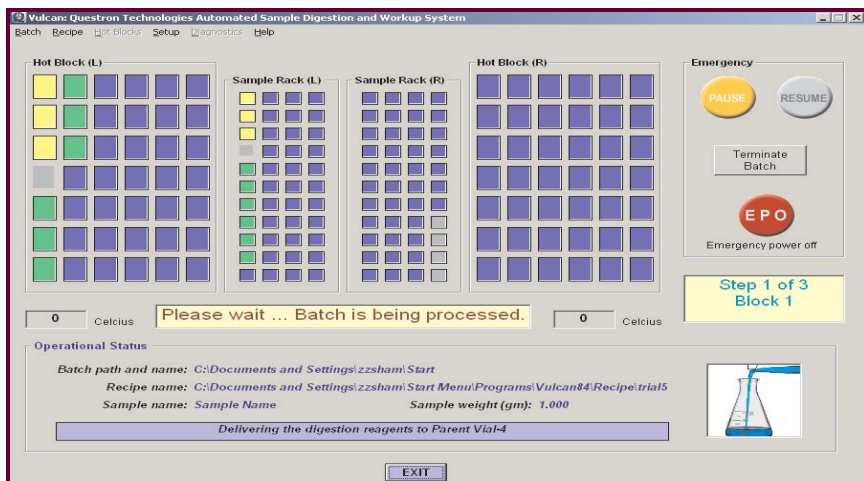
## Introduction

Questron Technologies' **Vulcan 84** is the first automated workstation product, combining the two essential steps of chemical sample preparation carried out in hundreds of analytical labs worldwide – sample digestion followed by sample work-up.

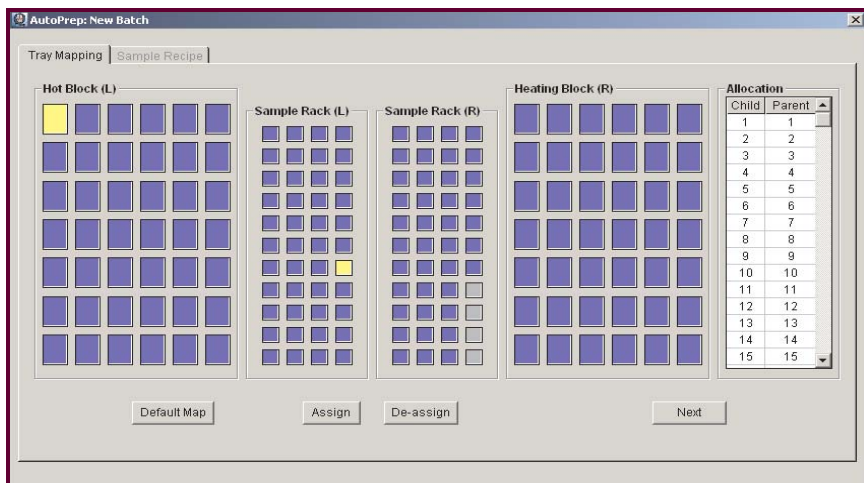
**Vulcan 84** was designed to take the drudgery and monotonous repetition of everyday tasks required both in the digestion of a group of samples and their subsequent dilution and/or transfer into an autosampler rack for analysis. These mechanical tasks usually require repetitive and careful measurement with great precision such as weighing samples, pouring precise amounts of reagents, monitoring temperatures, and timing various events. Furthermore, repetitive handling of concentrated acids and other reagents in the presence of hot surfaces subjects the operator to increased risk of unfortunate accidents.

For these reasons, these tasks are all better left to the automated watch of a computerized workstation, leaving the analyst the time and energy to perform more interesting functions, leading to more efficiency, more safety, and less errors.

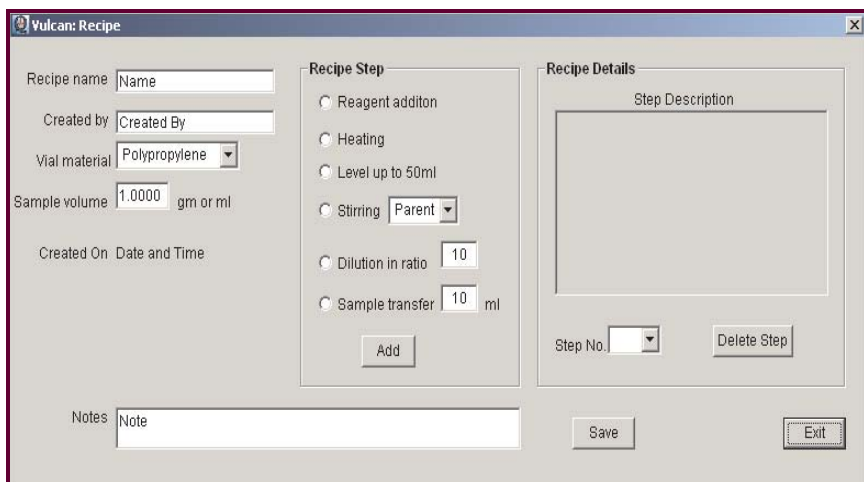




Historically, and still today, many people digest samples using beakers on a hot plate in a fume hood. With recent advances in automation technology and sample digestion techniques, two methods have come into wide usage - block digestion and microwave-assisted digestion. While both these techniques have their niche applications, our **Vulcan 84** system has taken block digesters to the next level. It represents a product that combines the significant advantages of block digestion with the automation capabilities of a computerized workstation. In a standard block digestion process, an analyst has to pipette multiple reagents into a large number of sample vessels, being uncertain whether or not a mistake has occurred in this repetitive exercise. Subsequent to this, the prepared sample vials are set into the block digester in a fume hood and sample heating is initiated to reach a specific reaction temperature for a specific time, being mindful that sample evaporations are kept under control and a safe digestion ensues without “bumping” of the digests.



Once a digestion is complete, the analyst waits for the samples to cool for safe handling, following which he or she will manually top up all digests to a certain level - human eyes and a sure steady hand are the only guide to the success of this step. Upon completing this, the next step is to transfer a known amount of each sample into smaller tubes for an autosampler rack that is associated with the analysis instrument, such as an ICP or AA. After all this, one is finally ready to proceed with the next step in sample processing.



Questron’s **Vulcan 84** is designed to relieve the analyst from all these steps. Instead of actually doing a digestion process, the analyst first sits in front of a computer and develops a *Recipe* file and a *Sample Batch* file. The *Recipe* file contains all information about the heating profile of the run as well as the reagents and quantities to be delivered, sample mixing times (using the sample bubbler), as well as information about the dilution factors and sample rack preparation. There may be tens of different *Recipe* files, made either by Questron or the user and any one of them could be loaded to initiate a run.

The user then builds a *Batch* file which contains sample details as well as their physical locations in the digestion block. Further to this, one is ready to go. Make sure that the sample vessels are loaded as per the *Batch* file, press *Start* and walk away. At the conclusion of the run, samples are ready to analyze. The temperature profile, dilution factors and other pertinent information about the run are all stored in a *Report* file.

## **Microwave or Digestion Block – the choice is yours. We manufacture both products.**

| <b>Parameter</b>                  | <b>Microwave Digestion<br/>(QLAB 8000, QWAVE 4000, QWAVE 1000)</b>  | <b>Vulcan 84</b>  |
|-----------------------------------|---|---|
| Run size                          | Depending on the vessel set, our systems can digest up to 30 samples.   | 84 samples in 50 ml vials. Larger or smaller digestion vials are available.   |
| Sample size                       | Typically less than 1.0 gm of inorganic samples. Smaller size for organic samples.  | Up to 5 gm can be handled by 84 sample block. Bigger samples may be used with larger vials.                                     |
| Operator involvement              | Regular attention required. Some disassembling and reassembling of vessels.   | Less attention needed. Put samples in vials, load vials into digester, select recipe and start. Run can be performed overnight. |
| Flexibility of reagents           | Questron models accommodate most acids.   | Multi step process possible. Reagents can be automatically added during digestion process.                                      |
| Quality of Digestion              | Best digestions with best repeatability and highest recoveries.   | Excellent repeatability but recoveries will depend on analyte elements and recipe used.   |
| Other significant characteristics | Sample size is dictated by nature of reaction products at reaction temperature.   | Recoveries will be subject to reaction temperature and nature of the analytes.  |
| Approximate cost                  | Initial cost: \$12K to \$25K. Consumable cost weighed towards replacement of hardware such as sensors and inner vessels. Low reagent usage. | Initial cost: \$40K. Consumable cost is low. Comparatively higher reagent usage.  |

## **Unique features**

### **Contaminant-free digestions**

Within a dilution cycle, the sample probe is rinsed prior to handling of the next sample. Most components, including our XYZ motion arm and associated rails are made of engineered plastics. This prevents contamination issues as well as premature failures and reliability problems that necessitate constant maintenance with other autosampler and workstation designs. Finally, Questron utilizes our *Point-of-Source Fume Removal System* that permits collection of fumes in the near vicinity of the samples and transports them very efficiently to an output duct, which is usually directed to a fume hood. This avoids dispersion and condensation of fumes in the hot block chamber. Also, we use clean, graduated, polypropylene vessels that require no pre-cleaning. These can be used as sample storage containers after digestion. As an option, we also provide glass vials or Teflon containers of various sizes.

### **Totally PC computer driven**

**Vulcan 84** is connected to a standard Windows® XP™ or Windows® 2000™ OS PC, which controls all functions seamlessly. Our AutoPrep software application is intelligently designed with functionality, not fluff. User made *Recipe* and *Batch* files control all events. All data from a run is conveniently available in a *Report* file.

### **Built with uncompromising safety features**

**Vulcan 84** is made to operate with minimum interaction from the analyst. No pipetting of reagents and no touching hot surfaces. The digestion block heaters are protected from runaway temperatures by thermal fuses. Questron's *Point-of-Source Fume Removal System* safely extracts toxic digestion by-products.

### **Accuracy**

Our careful attention to digestion block heating control enables a uniformity of temperature to  $\pm 1^\circ\text{C}$ . This provides excellent sample to sample temperature uniformity. Furthermore, the absolute temperature is closely regulated by the *Recipe* files. All our fluid deliveries and pickups are via syringe pumps, enabling unparalleled accuracies in reagent delivery. No calibrations or checking of accuracy is required. We do not use peristaltic pumps or other inferior fluid transfer components. The system sample level detector enables accurate topping up of samples after digestion. This accuracy is good to 500 micron height detection.

## Specifications

### Hot Block

|                    |                         |
|--------------------|-------------------------|
| Material           | Teflon® coated Graphite |
| Temperature rating | 230°C                   |
| Accuracy           | ±1°C                    |
| Capacity           | 42 x 50 ml vials        |

### Fluid transfer system

|                                |                      |
|--------------------------------|----------------------|
| Rate of delivery               | 2 ml per second      |
| Accuracy of delivery           | ±0.05 ml             |
| Level sensing accuracy         | 500 µ of vial height |
| Number of independent reagents | Up to 5              |

*(Rinse refreshed by peristaltic pump)*

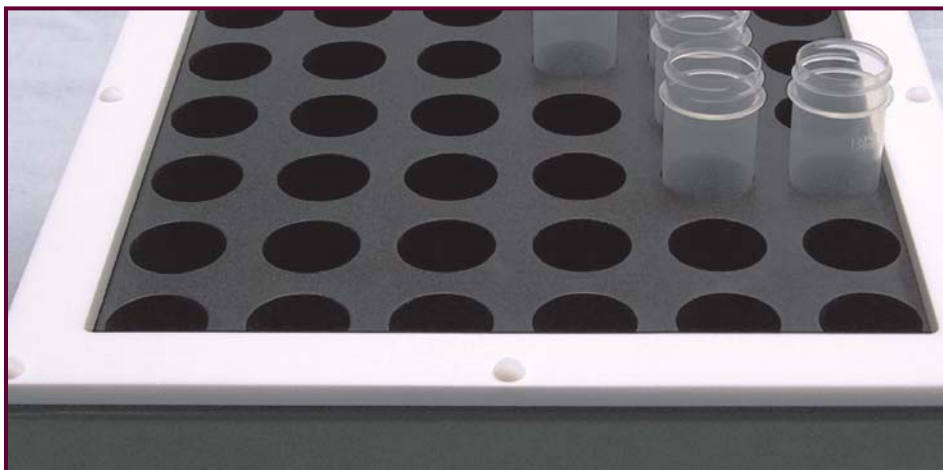
### Physical

|                                     |                                    |
|-------------------------------------|------------------------------------|
| Dimensions (width x depth x height) | 119 x 51 x 68 cm (43" x 20" x 27") |
| Weight                              | 75 kg. (165 lbs.)                  |
| Shipping weight                     | 110 kg. (243 lbs.)                 |
| Electrical                          | 200-220 VAC / 12A / 50-60Hz        |
| Exhaust (unrestricted air draw)     | Minimum 300 CFM required           |
| Sample capacity                     | 84 samples for 50 ml vials.        |

*(Please enquire for other sizes.)*

### Minimum computer requirement

PC Notebook or Desktop, Windows® XP™ or Windows® 2000™  
2 USB ports, 512 MB RAM, 80 GB HD



Your local distributor:

## Ordering guide

- **DIL-6** Vulcan 84 Automated Digestion and Sample Work-up System
- **DIG-6** Vulcan 84 Automated Digestion and Dilution System
- **RDS-6** Vulcan 84 Automated Reagent Delivery System
- **HBG-510** Hot Block - 42 positions, 50 ml vials
- **VL-50P** 50 ml Polypropylene Vial
- **VL-50T** 50 ml Teflon® Vial
- **VL-50G** 50 ml Glass Vial

## Questron Technologies Corp.

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