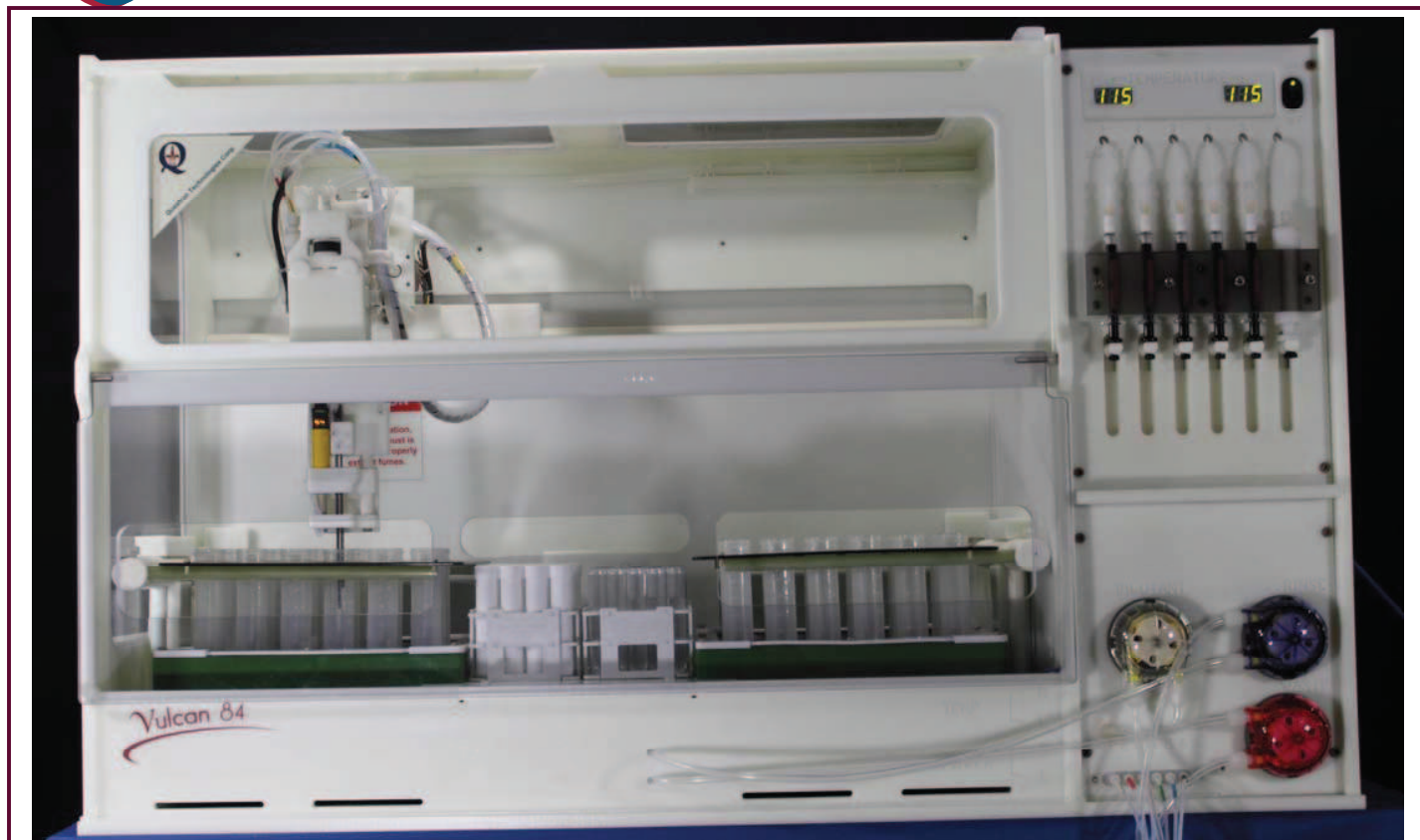




# Vulcan 84

*Automated Digestion & Work-Up Station*

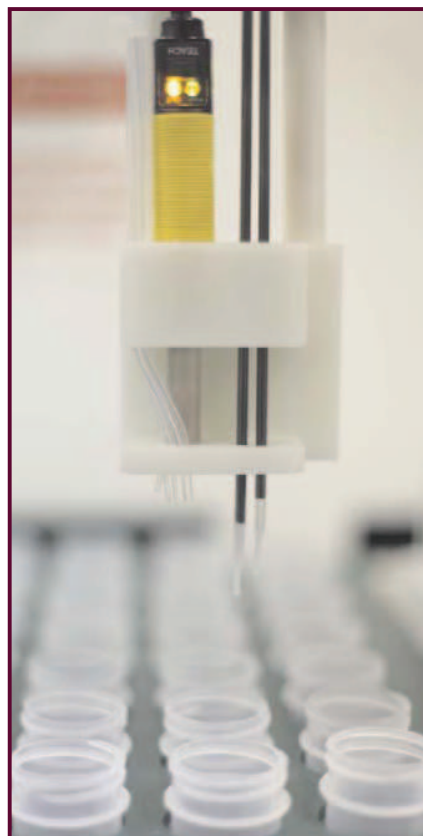


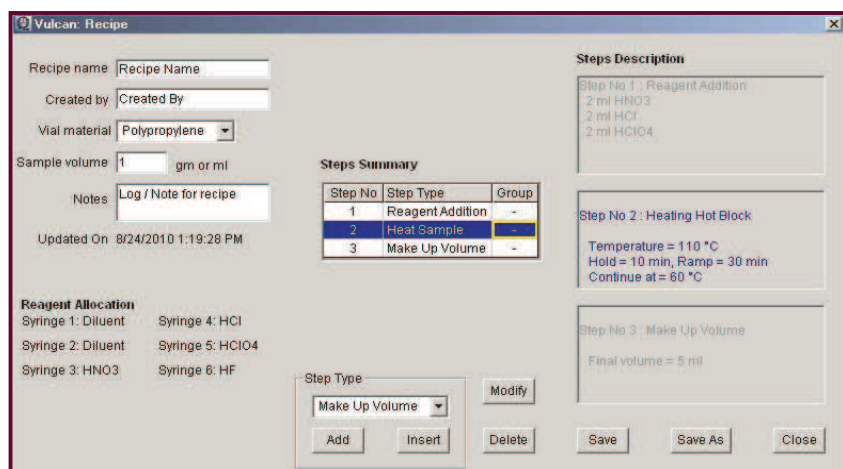
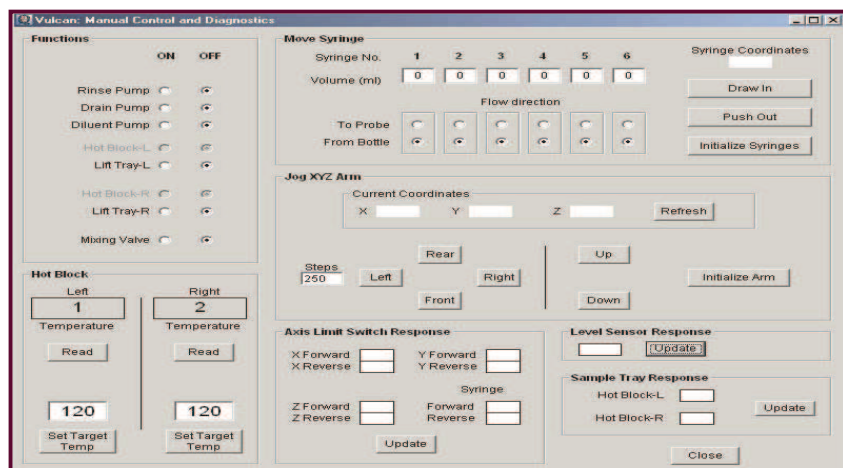
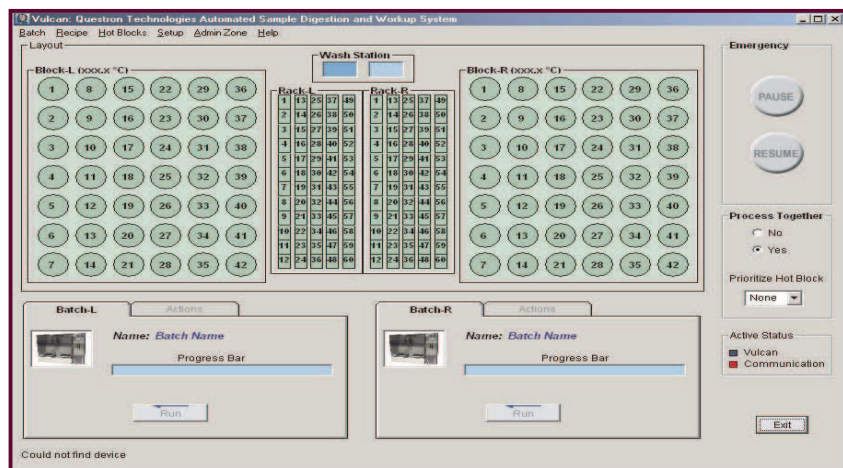
## Introduction

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 required both in the digestion of a group of samples and their subsequent dilution and/or transfer into an autosampler rack for analysis. These critical 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 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 other tasks. All this leads to better efficiency, better safety, and smaller 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 metals 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 42** and **Vulcan 84** systems have taken block digesters to the next level. The Vulcan line of products 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. Only after all this, is one finally ready to proceed with 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 aerator), as well as information about 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. After these steps, the digestion process is ready to proceed. Make sure that the sample vessels are loaded as per the *Batch* file instructions, press *Start* and walk away. At the conclusion of the run, samples are ready to analyze. The temperature profile, dilution factors data, 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.***

Parameter	Microwave Digestion (QLAB 8000, QWAVE 4000, QWAVE 1000)	Vulcan 84
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 disassembly and reassembly 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: \$50K. 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 highly efficient *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® 7™ 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 *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)*

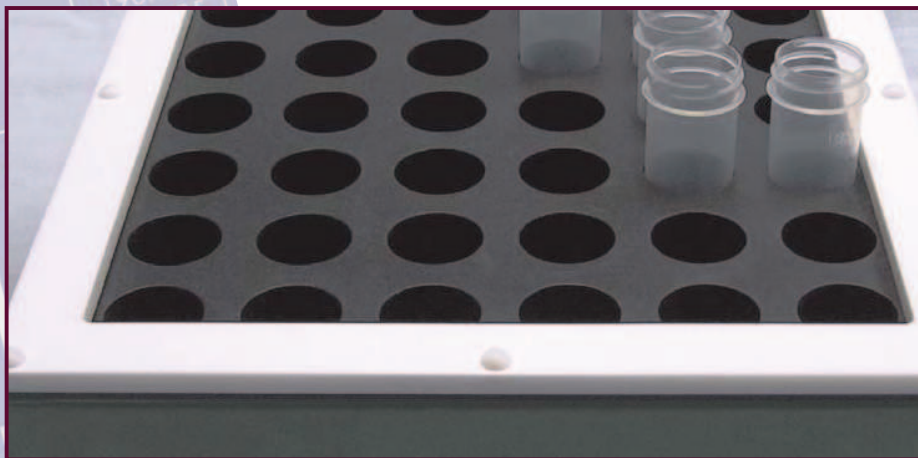
### Physical

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 120 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® 7™  
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
• 10-999-801	Hot Block 4200
• 84-100-123	50 ml Polypropylene Vial (for temperatures up to 120°C)
• 84-100-223	50 ml Teflon® Vial (for temperatures up to 230°C)
• 84-100-333	50 ml Glass Vial (for temperatures up to 230°C)

## Questron Technologies Corp.

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